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NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

**ASSESSMENT OF PUBLIC HEALTH INFRASTRUCTURE
TO DETERMINE PUBLIC HEALTH PREPAREDNESS**

by

Denise L. Santiago

March 2006

Thesis Advisor:
Second Reader:

Anke Richter
Paul Stockton

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**ASSESSMENT OF PUBLIC HEALTH INFRASTRUCTURE TO DETERMINE
PUBLIC HEALTH PREPAREDNESS**

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Submitted in partial fulfillment of the
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**MASTER OF ARTS IN SECURITY STUDIES
(HOMELAND SECURITY AND DEFENSE)**

from the

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ABSTRACT

Since September 2001, health threats associated with acts of terrorism have become an area of increasing concern. The Strategy for Homeland Security stresses the need for a robust public health component to quickly respond to and recover from attacks and other emergencies. The assumption that public health is an optimal system that simply needs to be aimed in new directions is fundamentally flawed. Public health baseline requirements for responding to threats are not as well understood as they might be. The purpose of this research is to help establish a common and accurate measure for assessing the public health infrastructure. Using the case study of Union County, New Jersey this thesis surveys the activities public health agencies are expected to perform; compares performance to target objectives; and employs a manpower matrix as a model for determining staffing requirements for local public health. This study argues that the goal of sustainable funding for public health begins with an accurate measure of the capacities of the system in relation to demands placed upon it. Without such a measure public health will continue to fail in its primary functions and lack the capacity to meet Homeland Security goals.

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LIST OF ABBREVIATIONS/ACRONYMS

APEX	Assessment Protocol for Excellence in Public Health
ASTHO	Association of State and Territorial Health Officials
BERM	Biological Epidemic Response Model
CDC	Centers for Disease Control and Prevention
CHES	Certified Health Educator Specialist
CHIP	Community Health Improvement Plan
DHS	Department of Homeland Security
EOC	emergency operation center
EPI	Epidemiologist
ESF	Emergency Support Functions
FTE	Full Time Equivalent
HCC	Health Command Center
HERC	Health Educator/Risk Communicator
HHS	US Department of Health and Human Services (HHS)
HIPPA	Health Insurance Privacy and Portability Act
HSPD	Homeland Security Presidential Directive
IOM	Institutes of Medicine
IT	Information Technology Specialist
LBOH	Local Board of Health
LHA	Local Health Agency
LHER	Local Health Evaluation Report
LINCS	Local Information Network Communication System
MAPP	Mobilizing for Action through Planning and Partnerships
MCC	Medical Coordinating Center
NJAC	New Jersey Administrative Code
NACCHO	National Association of County and City Health Officials
NIMS	national incident management system
NJDHSS	New Jersey Department of Health Senior Services
NJOEM	New Jersey Office of Emergency Management
NRP	national Response Plan
PHN	Public Health Nurse
POD	Points of Distribution
RCT	Required Critical Tasks
REHS	Registered Environmental Health Specialist
SARS	Severe Acute Respiratory Syndrome
SNS	Strategic national Stockpile
T3	TOPOFF3
TFAH	Trust for America's Health

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I. INTRODUCTION

A. PROBLEM STATEMENT

There is an urgency to strengthen the public health infrastructure and define its role in homeland security but the question remains: are policy makers willing to invest in public health so that gaps can be filled and an effective response mounted? This is where the heart of the problem lies. Our baseline requirements for responding to new threats are not as well understood as they should be. The lack of assessment is at the heart of many of our response inadequacies. The basic assumption is that public health is an optimal system that simply needs to be refocused and aimed in new directions. The fact is that well before September 11, 2001, public health agencies have not been a high priority for decades; lean state and local budgets have made matters worse and most health agencies are barely staffed to run during a normal 9-5 workday.¹ Public Health simply *does not* have the manpower to get the job done. “Nationally, the ratio of public health workers to the population has dropped from 219 per 100,000 in 1980 to 158 per 100,000 in 2,000.”² The purpose of this research is to assess the public health infrastructure in Union County, New Jersey. There are forty-seven local public health professionals employed within ten local health departments. This represents a ratio of *nine public health workers per 100,000 populations*. Based on this statistic, Union County is well below the national average in the public health workforce. Public health will not be able to meet the demands of traditional health services and bioterrorism response if the baseline public health infrastructure is not realistically evaluated. This paper will assess the many activities that public health agencies are expected to perform; compare actual performance to target objectives; and employ a manpower matrix to determine baseline staffing requirements for local public health departments.

¹ Stephen Flynn, *America the Vulnerable: How the U.S. has Failed to Secure the Homeland and Protect Us from Terrorism* (New York, NY: HarperCollins, 2004).

² *Public Health Security and Bioterrorism Preparedness and Response Act of 2002*, Public Law 107-188 (2002), http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=107_cong_public_laws&docid=f:publ188.107.pdf (accessed February 3, 2006).

For decades, the U.S. Department of Health and Human Services (DHHS) has published objectives for a Healthy America. These objectives map a strategy for reducing morbidity and mortality from preventable diseases. For decades the public health community has been content to make small advances toward these objectives while thousands of Americans annually fall victim to these same diseases, almost as if they are “acceptable losses” in the disease prevention war. The fallout of such an incremental approach has serious implications in terms of integrating homeland security imperatives with the more traditional roles of public health. The Strategy for Homeland Security stresses the need for a robust public health component to quickly respond to and, eventually recover from a biological attack. This Strategy relies on the same infrastructure that has been incapable of meeting traditional core public health objectives. It relies on an infrastructure that has been studied and found lacking both in capacity and capability vis-à-vis its workforce. Without a serious effort to address the weaknesses in the public health infrastructure, it is unlikely that a strategy can be effectively crafted to meet the competing demands of public health preparedness at the federal, state and local levels.

As the public health infrastructure is evaluated throughout this thesis, it is important to remember that public health is not representative of hospitals, emergency rooms or ambulances; it is the provider of last resort for an array of health services that have little to do with Homeland Security. Homeland Security funding has been distributed citing “dual use functionality” and “all hazards” preparedness and yet public health has not been given the same opportunity to reach a preparedness level equivalent to police and fire responding agencies. Public health must demand sustained funding and resources or public health will continue to fail its primary function and lack the capacity to meet Homeland Security goals.

B. DEFINING THE THREAT

Since the anthrax attacks of 2001, health threats associated with acts of terrorism have become one of many areas of increasing concern for both public health and homeland security professionals. Confronting dangers posed by weapons of mass destruction, advanced biological weapons and natural threats presents a range of new

challenges to public health officials in their efforts to protect the health of the population. Threats posed by these events reveal that “public health remains the weakest link in homeland security”³ and the national homeland defense strategy.

1. Origin of the Threat

The origins of public health go back at least as far as Biblical times when Hebrews instituted dietary restrictions that may have been based upon an evolving sense of hygiene. Many centuries later in 1374, port quarantine measures were imposed on new ship arrivals in Venice in efforts to stem the spread of Plague. On May 14, 1796, Edward Jenner performed public health’s most famous immunization by inoculating eight-year-old James Phipps with Cow Pox. When the boy later proved to be immune to Small Pox humanity was on its way to taming the microbe. Between 1877 and 1887 Louis Pasteur advanced the Germ Theory of disease. Pasteur proved that diseases were caused by microbes, identified staphylococcus, streptococcus, pneumococcus, and revealed the existence of viral agents. Earlier foundations had been laid in 1851 at the first International Sanitary Conference, which was convened so that world medical authorities could confer on quarantine and other international health issues.

In 1866, the New Jersey Sanitary Commission was formed to advise the Governor on public health matters in the wake of devastating cholera outbreaks in the urban centers. The re-growth of European cities during the later middle ages followed by the eighteenth-century Industrial Revolution had brought thousands of new people into overcrowded urban centers. Many from rural areas migrated to urban industrial and commercial centers and found housing wherever they could, often crowding several generations of immediate and extended family into living spaces meant to serve far fewer people. These trends continued as huge numbers of the rural and urban populace left Europe and Asia for the growing cities of the U.S. in the nineteenth and early twentieth centuries.

³ Shelley A. Hearne, *Two Years After the Anthrax Attacks, Public Health Preparedness Still Weakest Link of Homeland Security, Expert Says* (Washington, DC: Trust for America's Health, 2003), <http://healthyamericans.org/newsroom/releases/release100203.pdf> (accessed February 26, 2006).

Early U.S. public health efforts focused on urban areas to provide safe housing, clean drinking water and sanitary disposal of solid and human waste. Insect and vector control became a key tool for defeating typhoid and other epidemics. Immunization was employed to curb what are now called childhood diseases of polio, measles, mumps, diphtheria and rubella. By the 1960s, the public health focus shifted to environmental causes of disease and the elimination of pollution. As environmental issues gradually improved, the public health priorities again shifted, this time to individual, lifestyle factors that increased risk of developing chronic illnesses.

Today an ordinary person might view public health as little more than an entity that regulates restaurant cleanliness, or investigates neighborhood complaints such as high weeds, rodents, or odors. The human face of public health is typically a nurse who administers childhood immunizations or senior citizen flu shots. These activities are at the core of public health essential services but are now being overshadowed by more sophisticated activities associated with bioterrorism prevention and all hazards planning.

2. Weapons of Mass Destruction

In 1991, the Nunn-Lugar Act established the Cooperative Threat Reduction Program (CTR). This act provided U.S. funding and expertise to safeguard and dismantle Russian stockpiles of nuclear, chemical and biological weapons. In 1997, the Defense against Weapons of Mass Destruction Act was passed. In response to threats of terrorists using weapons of mass destruction (WMD), the act provided additional funding for WMD awareness training, enhanced response capability and to carry out a program for exercising response capabilities for first responders.⁴ The 9/11 Commission Report endorsed the Nunn-Lugar program by saying “preventing the proliferation of [weapons of mass destruction] warrants a maximum effort—by strengthening counter-proliferation efforts, expanding the Proliferation Security Initiative and supporting the Cooperative

⁴ *Defense Against Weapons of Mass Destruction Act of 1996*, Public Law Public Law 104-201 Sec. 1401, (1996), http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=104_cong_public_laws&docid=f:publ201.104.pdf (accessed February 26, 2006).

Threat Reduction Program.”⁵ The report went on to say that Nunn-Lugar is now in need of expansion, improvement and resources.

When we think of major threats to our national security, one of the first that comes to mind is the enormous potential to inflict harm that a biological weapon possesses. A terrorist can unleash nuclear-style destruction without the risk of detection of a radioactive source. To address growing concerns about bioterrorism, emerging infectious disease, and the ability of the public health system to respond, Congress passed two landmark bills: 1) The Public Health Threats and Emergencies Act of 2000 (PL-106-505), and 2) The Public Health Security and Bioterrorism Act of 2002 (PL-107-288). These laws marked the beginning for federal government roles in directing funding towards public health preparedness. Approximately \$534 million dollars was allocated to preparedness, of which \$99 million was directed to rebuilding public health capacities.⁶ Today, the lack of sustained funding and the federal government’s insistence on relying on a “fragmented and inadequate”⁷ public health infrastructure results in a system of public health that remains unprepared. While the additional funding was helpful in beginning bioterrorism planning, the funds were only temporary. Therefore, they could only address changes in tools, hardware, communications, and similar items but not address fundamental personnel issues.

3. Bioterrorism

In the wake of the September 11, 2001 terrorist attack, the significance of the role of public health was an eye opener for the entire nation. Almost immediately afterwards, letters laced with powdered anthrax spores were intentionally sent through the postal system and resulted in the loss of life and affected many others. This bioterrorist attack

⁵ National Commission on Terrorist Attacks upon the United States. *The 9/11 Commission Report: Final Report of the National Commission on Terrorist Attacks upon the United States* (Washington, D.C.: National Commission on Terrorist Attacks upon the United States, 2004), <http://www.gpoaccess.gov/911/> (accessed February 6, 2006).

⁶ United States Congress, Senate, Committee on Health, Education, Labor, and Pensions, *Public Health Threats and Emergencies Act : Report (to Accompany S. 2731)* (Washington, DC: U.S. G.P.O, 2000), <http://purl.access.gpo.gov/GPO/LPS7343> (accessed February 4, 2006).

⁷ Elizabeth Fee and Theodore M. Brown, "The Unfulfilled Promise of Public Health: Deja Vu all Over again," *Health Affairs* 21, no. 6 (November/December, 2002): 31, <http://proquest.umi.com/> (accessed February 3, 2006).

challenged the New Jersey public health system and its capacity to respond to an act of terrorism. Overnight the New Jersey State Department of Health and Senior Services (NJDHSS) and the New Jersey State Police (NJSP) laboratories were overwhelmed with *white powder samples* needing identification. Issues such as chain of custody, epidemiological investigation and mass prophylaxis needed to be addressed. The public health community, at every level of government, found itself facing new and difficult questions as it attempted to translate complex scientific information into something the public could digest and trust. Public health found itself suddenly allied with players and agencies never imagined and became immersed in turf battles and the competition of the “who’s in charge” sweepstakes.

4. Natural Hazards

The threat of an avian influenza pandemic or natural hazards such as the 2005 record breaking hurricane season has also placed greater demands on public health and questions are being raised about local, state and federal governments’ ability to respond and protect the health of the *homeland*. Hurricane Katrina illustrated how quickly local and state government resources can be overwhelmed. It is not that such events are completely unexpected. Epidemics and storms have happened before and will again but with the greater magnitude of these events and the climate of redefinition inspired by homeland security concerns they are being viewed in a different light by the public and policy makers. The need to reach a higher level of preparedness to respond to bioterrorism, the need to promptly identify outbreaks of infectious disease and the need to respond to naturally occurring public health threats and emergencies have been driven home to the American public with a greater emphasis.

In November 2005, The National Strategy for Pandemic Influenza was released and outlines how we, as a nation, intend to prepare, detect, and respond to a pandemic.⁸ The concern is that an epidemic will become widespread, affecting many different countries and populations. Mitigation issues deal with early detection at home and abroad. The earlier the epidemic is identified the more time is available for preventative

⁸ U.S. Homeland Security Council, *National Strategy for Pandemic Influenza* (Washington, D.C.: Homeland Security Council, 2005), <http://www.whitehouse.gov/homeland/pandemic-influenza.html> (accessed February 26, 2006).

action and treatment. Key to a pandemic response is an adequate supply of medicine. The pandemic plan addresses stockpiling existing medications; increasing manufacturing capacity; and, removing liability exposure to vaccine manufacturers. Finally, state and local health agencies are required to plan a medical response for strategic national stockpile (SNS) deployment utilizing existing medical resources. The plan is comprehensive at first glance but it fails to provide resources (manpower) to accomplish the detection, planning or response elements; and, the timeline for acquisition of existing medications or development of new vaccines is too far forward to provide any short term help. In other words, the plan is largely window dressing and lip service.

C. A DETERIORATING PUBLIC HEALTH INFRASTRUCTURE

Public health is a fragmented and inadequate infrastructure at all levels of government and has been identified as a critical flaw, among several other inadequacies, in Homeland Security preparedness.⁹ The problem stems from the fact that today-there is a fundamental mismatch between expectations placed on public health and the system's ability to respond. The traditional mission of public health "fulfilling society's interest in assuring conditions in which people can be healthy"¹⁰ and the vision to "promote physical and mental health and prevent disease, injury and disability" has remained the same for decades but is now being redirected and redefined by new demands.

In a 2003 study, "Implications of the World Trade Center Attack for the Public Health and the Health Care Infrastructure," Klitzman and Freudenberg identified several shortcomings in the New York City public health infrastructure. These shortcomings were specific to New York City but common to public health both pre- and post-September 11, 2001. They found ambiguity concerning duties and responsibilities in the emergency response system that hampered response cohesion particularly between law enforcement and public health. In their lessons learned analysis, they found that planning has limits and that no plan can anticipate all possibilities, demonstrating that it is critical

⁹ *9/11 Commission Report*.

¹⁰ Institute of Medicine (U.S.), Committee for the Study of the Future of Public Health, *The Future of Public Health* (Washington, D.C: National Academy Press, 1988), 225, <http://www.nap.edu/catalog/1091.html> (accessed February 4, 2006).

to maintain a robust public health infrastructure that has reserve capacity beyond routine functioning when planning and responding to a natural and unexpected disaster.¹¹ The authors concluded that it was imperative to find a balance between resources needed for routine public health functions and maintaining a workforce capable of responding to an emergency. It is the coordination and collaboration between local, county and state agencies that is critical to the improvement of the public health response.

“Government public health is considered the backbone of the public health system.”¹² Why then are we not better prepared? It is not as though federal and state governments were unaware that “the public health infrastructure was in disarray.”¹³ For decades additional mandates were being piled on an unraveling public health infrastructure. This issue was the focus of a 1988 report by the Institutes of Medicine (IOM) called *The Future of Public Health*. In this report, the IOM warned of the deteriorating public health workforce¹⁴ and in their follow up report, fourteen years later, concerns continued as “little improvement was made despite the enormous gains made in health status, the United States public health infrastructure did not meet many of the objectives listed in the prior report.¹⁵ When compared to other nations the United States lags in life expectancy, behind twenty-eight other countries including the United Kingdom, France, Germany and Japan. U.S. infant mortality is also higher than Cuba, Czech Republic, Japan, France and Australia, among others.¹⁶ The disparity in health status between racial and ethnic groups, men and women, and income levels is a growing

¹¹ S. Klitzman and N. Freudenberg, "Implications of the World Trade Center Attack for the Public Health and Health Care Infrastructures," *American Journal of Public Health* 93, no. 3 (March, 2003): 400-406 (accessed July 14, 2005).

¹² Institute of Medicine (U.S.), Committee on Assuring the Health of the Public in the 21st Century, *The Future of the Public's Health in the 21st Century*, <http://newton.nap.edu/books/030908704X/html/ ed.> (Washington, D.C: National Academies Press, 2003), 509 (accessed February 4, 2006).

¹³ Committee for the Study of the Future of Public Health, *Future of Public Health*, 225.

¹⁴ Ibid.

¹⁵ Committee on Assuring the Health of the Public in the 21st Century, *Future of the Public's Health in the 21st Century*, 509.

¹⁶ United Health Foundation, *America's Health: State Health Rankings - 2004 Edition* (Minnetonka, MN: United Health Foundation, 2004), <http://www.unitedhealthfoundation.org/mediakit/shrmediakit/State%20Health%202004.pdf> (accessed February 4, 2006).

concern. It was also noted in the 2002 IOM report that an effective public health system could assure improvements in each of these areas if the infrastructure was adequate to meet prevention objectives.

Other government agencies also examined these issues. In 2001, the Centers for Disease Control and Prevention (CDC) prepared a Status Report, *Public Health's Infrastructure: Every Health Department Fully Prepared; Every Community Better Protected*, revealing to a Congressional appropriations committee that the public health community was still structurally weak in nearly every area and there was a need to address critical gaps in the workforce capacity and competency. The report concluded that "our immediate investment today will buy something truly priceless for tomorrow – enhanced protection for all Americans and improved health for future generations."¹⁷ However, funding when it does allow workforce improvement only allows staff to work within the narrow confines of the grant. This creates funding stovepipes that do little to truly enhance the infrastructure.

Studies conducted by prominent public health associations; National Association of County and City Health Officials (NACCHO) and the Association of State and Territorial Health Officials (ASTHO), are being used as models to identify public health infrastructure weaknesses and evaluate the gaps that impact public health preparedness. In October 2001, NACCHO received a grant from Robert Wood Johnson and conducted a nationwide study. The *Local Public Health Agency Infrastructure-A Chart book* highlighted the important role of public health and current infrastructure deficiencies by identifying the workforce duties and compositions of the local health agency (LHA) and areas for future improvements. However, there was no effort to determine the optimal workforce staffing level needed to accomplish the government public health mission.

¹⁷ United States Department of Health and Human Services, Centers for Disease Control and Prevention, *Public Health's Infrastructure a Status Report* (Atlanta, GA: Centers for Disease Control and Prevention, 2001), <http://www.phppo.cdc.gov/documents/phireport2%5F16.pdf> (accessed February 3, 2006).

In 2004, ASTHO published a report entitled *State Public Health Employee Worker Shortage* which stated that an adequate supply of competent public health professionals is a vital component of the government public health infrastructure. ASTHO believes that the lack of public health workers is a crisis for national public health preparedness.¹⁸ The report made several recommendations that are intended to address the deficiencies. Among them are raising salaries to make public health officials more competitive with the private sector; improving workforce competencies through education; formation of regional partnerships; and increasing utilization of improved technologies to improve effectiveness of the existing workforce.

The closest attempt to quantify the extent of the workforce shortage was a 2004 study titled *The Public Health Workforce* by Tilson and Gebbie who described the scope and content of work done by the (public health) workforce in the field.¹⁹ This report identified the need to gain hard evidence to formulate a rational public health policy. They went beyond the IOM reports that identified manpower shortages and elaborated upon Klitzman and Freudenberg's observation regarding the importance of maintaining a system with reserve capacity. Rebuilding the public health infrastructure has been part of the national agenda most notably since September 11, 2001. The outcome thus far, however, has not resulted in a substantial improvement in local public health capacity or capability as witnessed by the response to events such as Severe Acute Respiratory Syndrome (SARS) and Hurricane Katrina.

D. METHODOLOGY

The focal point of this study is to assess the public health infrastructure in Union County, New Jersey. This county is worth studying because the infrastructure is weak and yet the mandates and expectations continue without serious consideration of the current baseline infrastructure. The objective of this research is to utilize and expand on

¹⁸ Association of State and Territorial Health Officials, *State Public Health Employee Worker Shortage Report: A Civil Service Recruitment and Retention Crisis* (Washington, DC: ASTHO, 2004), <http://www.astho.org/pubs/Workforce-Survey-Report-2.pdf> (accessed July 17, 2004).

¹⁹ Kristine M. Gebbie, *The Public Health Work Force : Enumeration 2000* (Washington, D.C: Health Resources and Services Administration, Bureau of Health Professions, National Center for Health Workforce Information and Analysis, 2000), 318 (accessed February 4, 2006).

the NJDHSS formula “Estimating Registered Environmental Health Staffing Needs for Local Health Departments”²⁰ when evaluating the public health infrastructure. This tool was developed to “determine how many staff is needed to adequately and professionally serve its community”²¹ but has only been applied to the registered environmental health specialist position. It is the intent of this research to adapt the formula to four core public health positions within a local health department. They include: 1) Epidemiologist 2) Health Educator/Risk Communicator 3) Public Health Nurse and the 4) Registered Environmental Health Specialist. Baseline requirements for core positions at a local health agency will be determined from the bioterrorism preparedness goals originated from the CDC and the public health mandates of the NJDHSS. By adapting the staffing matrix an adequate population based infrastructure can be determined to can meet traditional health services, bioterrorism planning and homeland security initiatives and expectations.

This study aims to assist in providing the tools for rebuilding and redeploying the public health infrastructure so that it can more effectively address the full range of traditional activities as well as the additional bioterrorism (BT) mandates. The key to improving the public health infrastructure lies in developing an empirical method to objectively determine workforce requirements and then formulating a policy that will fill those needs. This cannot be accomplished without a basis for understanding what needs to be done and how many public health people are needed to accomplish it on a daily basis. While specific to Union County, New Jersey, the framework used to estimate manpower requirements will be applicable to other counties and states in their own assessment of local public health infrastructures. The model can also be used to develop a rational funding formula for public health.

It is essential that stakeholders become made aware of the actual, rather than the perceived, day to day functions of public health. In the final analysis it will be public awareness that connects the political process to public health preparedness in terms of

²⁰ R. J. DiNunzio, "Estimating Registered Environmental Health Specialist Staff Needs for Local Health Departments," <http://www.state.nj.us/health/lh/rehsca11.htm> (accessed September 18, 2005).

²¹ R. J. DiNunzio, "Estimating Registered Environmental Health Specialist Staff Needs for Local Health Departments," <http://www.state.nj.us/health/lh/rehsca11.htm> (accessed September 18, 2005).

policy and resource allocation. Enumerating daily functions in terms of quantity and time needed provides a means to accurately predict the actual response capabilities of the public health system given its current staffing levels. This case study is designed to underscore the facts of the longstanding crisis in public health and sends a message that public health is hard pressed to meet the everyday demands they face let alone the unexpected. It is in the best interest of homeland security and state and local health agencies that an effective and coordinated countywide public health system be created utilizing the valuable assets, talent and experience resident in local health departments. “The challenge is to develop inter-connected and complementary systems that are reinforcing rather than duplicative and that ensure essential requirements are met.”²² To accomplish this mission, health departments need to be given tools and resources long denied so that they can succeed in the essential work ahead.

Chapter I introduced the importance of enhancing the public health infrastructure especially when being integrated into the homeland security realm. Chapter II identifies the challenges public health confronts when being expected to incorporate homeland security and bioterrorism initiatives into the traditional health services protecting the health of the community. Chapter II also provides an overall picture of public health and the obstacles public health faces when planning for an effective and coordinated response. Chapter III describes state and federal mandates framing the public health functions being conducted on a daily basis. Chapter VI describes the public health system in New Jersey and the structure in which mandates are addressed. Chapter V is a case study for Union County, New Jersey in which the work of four core public health positions are evaluated along with other bioterrorism positions. Chapter VI presents manpower estimates for the county to reach traditional essential public health services and bioterrorism preparedness objectives. Chapter VII concludes with an argument for sustained funding to build public health infrastructure.

²² United States Office of Homeland Security, *National Strategy for Homeland Security* (Washington, DC: Office of Homeland Security, 2002), 72, 4, <http://purl.access.gpo.gov/GPO/LPS20641> (accessed July 17, 2005).

II. CHALLENGES IN THE PUBLIC HEALTH WORKFORCE

Public health workforce studies reveal infrastructure shortages being created by budgetary neglect and an aging workforce nearing retirement. It is local health agencies (LHA) who have been hit hard because of an aging workforce, up to 45% of staff approaching retirement, vacancy rates as high as 20% and employee turnover rates as high as 14%.²³ Studies have recognized the need to build the infrastructure capacity of public health. Lacking are studies that provide staffing estimates for a population based infrastructure that is able to meet the challenges ahead. Without a clear idea of what resources are needed we will not be able to develop a realistic, defensible funding target. Investments in the public health infrastructure will serve a dual purpose: improving the delivery of health services at the local level and improving the response capability of public health as a partner with other first responders.

The discipline of public health is actually an assortment of many different skill sets. Some require specialized licensure and or training; some provide hands-on health care; others entail the scientific and forensic study of disease determinants; while others have police powers. All function independently, yet operate in unison and all are assigned overwhelming tasks that require prioritization according to the *need of the day*. It is important to define public health in such a way as to increase the understanding of the diversity of the workforce, their and duties and yet recognize the unity of purpose. Defining, classifying and integrating the public infrastructure have been the focus of increasing attention in meeting the challenges ahead.²⁴ It is critical to address these issues as public health plans of meeting the challenges.

A. DEFINING PUBLIC HEALTH

Public health has meant different things at different times in history and varies from state to state, within organizations and among professional associations. Lack of a universally accepted definition ultimately effects how the size, structure, location and

²³ Centers for Disease Control and Prevention, *Public Health's Infrastructure*.

²⁴ Gebbie, *Public Health Work Force*, 318.

staffing patterns can vary among a local health agency. Therefore performance and expectations has not been consistent for years. Consistent within the public health infrastructure are (1) the professionals who perform public health functions and (2) the mission of public health. “A public health professional is a person educated in public health or a related discipline who is employed to improve health through a population focus.”²⁵ The mission of public health is defined as fulfilling society’s interest in assuring conditions in which people can be healthy.”²⁶

Bernard Turnock, author of *Public Health: What is it and How it Works*, elaborated on this description and identified the activities of public health as “organized community efforts to prevent, identify, and counter threats to the health of the people”²⁷. In his book, Mr. Turnock refers to the 1988 IOM landmark study which became the foundation for public health workforce studies. In the study, public health is based on a systems managements approach by providing three core functions:

- 1) assessment of population health
- 2) policy development
- 3) assurance that high-quality public health services are available²⁸

Within the core functions are ten essential health services explaining how public health is involved with protecting the community. Figure 1 provides a basis of the ten essential services as related to the core functions in a system management approach to public health.

²⁵ Kristine Gebbie, Linda Rosenstock and Lyla M. Hernandez, *Who Will Keep the Public Healthy? Educating Public Health Professionals for the 21st Century*, <http://www.nap.edu/books/030908542X/html/> ed. (Washington, D.C: National Academy Press, Institute of Medicine Board on Health Promotion and Disease Prevention, 2002), (accessed February 4, 2006).

²⁶ Committee for the Study of the Future of Public Health, *Future of Public Health*, 225.

²⁷ Bernard J. Turnock, *Public Health: What it is and how it Works*, 3rd ed. (Sudbury, MA: Jones and Bartlett, 2004), 420 (accessed February 4, 2006).

²⁸ Committee for the Study of the Future of Public Health, *Future of Public Health*, 225.

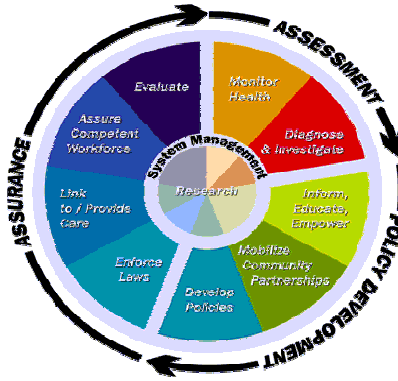


Figure 1. Ten Essential Health Services (From <http://www.health.gov/phfunctions/public.htm>)

The Essential Services provides a framework and a working definition of public health by describing the public health activities that should be undertaken in all communities.

- Assessment
 - 1) Monitor health status to identify and solve community services
 - 2) Diagnose and investigate health problems and hazards in the community
- Policy Development
 - 3) Inform, educate, and empower people about health issues
 - 4) Mobilize community partnerships to identify and solve health problems
 - 5) Develop policies and plans that support individual and community health efforts
- Assurance
 - 6) Enforce laws and regulations that protect health and ensure safety
 - 7) Link people to needed personal health services and assure the provision of health care when otherwise unavailable
 - 8) Assure a competent public health and personal health care
 - 9) Evaluate effectiveness, accessibility, and quality of personal and population-based health services

10) Research for new insights and innovative solutions to health problems.²⁹

It is important to note that local health agencies have been urged to embrace the essential health services as a means of working with their state health departments, communities, and governing bodies to develop a more robust public health capacity, and as a means of holding themselves uniformly accountable to the public they serve.³⁰ In November 2005, NACCHO attempted to define a LHA in a document known as *Operational Definition of a Functional Local Health Department*. This report is an attempt to provide the framework to secure additional funding and leverage resources needed at the local level.³¹ NACCHO agrees there are inconsistencies within LHAs, and yet each LHA is expected to meet the following standards:

- Understand the specific health issues confronting the community, and how physical, behavioral, environmental, social, and economic conditions affect them.
- Investigate health problems and health threats.
- Prevent, minimize, and contain adverse health effects from communicable diseases, disease outbreaks from unsafe food and water, chronic diseases, environmental hazards, injuries, and risky health behaviors.
- Lead planning and response activities for public health emergencies.
- Collaborate with other local responders and with state and federal agencies to intervene in other emergencies with public health significance (e.g., natural disasters)
- Implement health promotion programs.
- Engage the community to address public health issues.
- Develop partnerships with public and private healthcare providers and institutions, community based organizations, and other government agencies

²⁹ Public Health Functions Steering Committee, "Public Health in America," Office of Disease Prevention and Health Promotion, <http://www.health.gov/phfunctions/public.htm> (accessed February 4, 2006).

³⁰ National Association of County and City Health Officials, *Operational Definition of a Functional Local Health Department* (Washington, D.C.: National Association of County and City Health Officials, 2005), <http://www.naccho.org> (accessed February 4, 2006).

³¹ Ibid.

(e.g., housing authority, criminal justice, education) engaged in services that affect health to collectively identify, alleviate, and act on the sources of public health problems.

- Coordinate the public health system's efforts in an intentional, non-competitive, and non duplicative manner.
- Address health disparities.
- Serve as an essential resource for local governing bodies and policymakers on up-to-date public health laws and policies.
- Provide science-based, timely, and culturally competent health information and health alerts to the media and to the community.
- Provide its expertise to others who treat or address issues of public health significance.
- Ensure compliance with public health laws and ordinances, using enforcement authority when appropriate.
- Employ well-trained staff members who have the necessary resources to implement best practices and evidence-based programs and interventions.
- Facilitate research efforts, when approached by researchers that benefit the community.
- Use and contributes to the evidence base of public health.
- Strategically plan its services and activities, evaluate performance and outcomes, and make adjustments as needed to continually improve its effectiveness, enhance the community's health status, and meet the community's expectations.

It is interesting to see the term bioterrorism omitted from this document especially since the traditional role of public health is being upstaged by the threat of bioterrorism. Therefore, today's situation requires a comprehensive approach and, already, a re-definition.³²

B. CLASSIFYING PUBLIC HEALTH

Prior to their most recent attempt to define LHAs, NACCHO released the *Local Public Health Agency Infrastructure: a Chartbook*, in October 2001. The purpose of this report was to provide a strong concept of the public health infrastructure. It is a useful tool permitting local agencies to compare themselves to national averages and providing

³² Gebbie, Rosenstock and Hernandez, *Who Will Keep the Public Healthy?*

an extensive look at the local public health infrastructure that will help identify areas for improvement.³³ In New Jersey, public health services are provided almost exclusively at the local level, yet 55% of the entire New Jersey public health workforce is employed by the NJDHSS.³⁴ When determining whether a LHA is capable of meeting the expectation and challenges ahead, it is critical to classify the people who *actually perform* the essential health services. The population in New Jersey is a little more than eight million people and those employed at the LHA is 2,244.³⁵ This represents an average of twenty-eight public health employees per 100,000.

Other providers such as hospitals, voluntary health organizations, nongovernmental organizations, and the business community also provide services. Through collaboration and partnership with these agencies, public health is expected to not only provide direct services but to ensure that if the services are provided by these other agencies, they are incorporated into the strategy of how public health needs are met within the community. This is a difficult task because providers are not obligated to report the services they provide to any LHA. The fact remains, public health agencies have become the refuge of last resort for people without financial resources or health insurance.³⁶ Although acute medical care for the indigent is available through hospital emergency rooms and other health clinics, non-emergency, non-acute preventive services for the medically indigent remains almost exclusively the responsibility of the LHA. Public Health services that are performed by private practitioners or hospitals are expected to be reimbursed by insurance and therefore they reach those at or above 200% of poverty level. Government public health agencies remain the only ready sources of free health services for the medically indigent.

³³ Anjum Hajat, Carol K. Brown and Michael R. Frazer, *Local Public Health Agency Infrastructure : A Chartbook.*, 2001 ed. (Washington, D.C.; National Association of County and City Health Officials: National Association of County and City Health Officials, 2001), copy; Host: <http://www.naccho.org> copy of survey available at this url. Host: <http://www.rwjf.org> information about the Robert Wood Johnson Foundation available at this url. (accessed February 4, 2006).

³⁴ Gebbie, *Public Health Work Force*, 318.

³⁵ Ibid.

³⁶ Elin Gursky, *Progress and Peril Bioterrorism Preparedness Dollars and Public Health*, http://www.tcf.org/Publications/HomelandSecurity/Gursky_Progress_Peril.pdf ed. (New York, NY: Century Foundation, 2003) (accessed February 4, 2006).

C. INTEGRATING PUBLIC HEALTH INTO HOMELAND SECURITY

The role of public health at the national, federal, state and local level has become an important component of the Department of Homeland Security (DHS) and by witnessing recent disasters we can conclude that no single agency is prepared or equipped to mount a response independently. Any response will require cooperation between public health and emergency agencies at all levels of government.³⁷ It is, however, the public health sector that is the newest agency on the scene and is still working on integrating with other first responders such as police, fire, and emergency medical services. Homeland Security has elevated public health personnel to first responder status in that they are required to prepare, train, and respond with other first responders. This represents an additional workload that has not been captured in traditional public health capacity or work force estimates.

Public health is expected to participate as a full partner without sustained funding or adequate staff, further stressing an already over tasked infrastructure. The NJDHSS, for example, only allocates 1.2 percent of their health budget for local public health.³⁸ Union County receives \$538,113 for Bioterrorism planning and \$201,424 for Public Health Priority Funding used for providing essential health services. This represents an embarrassing \$1.41 per Union County resident. This miniscule amount cannot be allocated for emergency exercise, planning or response. It is not that public health does not want to participate in exercises, planning, or response; there is not enough time in the day let alone the personnel necessary to conduct a satisfactory job. The plan to incorporate public health preparedness into DHS is raising concerns and may further disunite these activities from essential public health functions and undermine the integration of bioterrorism preparedness planning into our existing public health infrastructure.³⁹

³⁷ *National Strategy for Homeland Security*, 72, 4.

³⁸ United Health Foundation, *America's Health: State Health Rankings* (Minnetonka, MN: United Health Foundation, 2003), <http://www.unitedhealthfoundation.org/shr2003/> (accessed February 4, 2006).

³⁹ Bruce Clements and R. Gregory Evans, "Bioterrorism Preparedness Coordination: An Antacids Saga Continues," *Public Health Reports* 119, no. 1 (January/February, 2004): 16-18, http://www.publichealthreports.org/userfiles/119_1/119016.pdf (accessed February 4, 2006).

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III. MAPPING THE TERRAIN OF THE PROBLEM

The Public Health landscape differs at the federal, state and local level. Like a satellite photo, the view from aloft is beautiful, but as you zoom in – detail becomes visible and faults are exposed. A Homeland Security strategy that is developed solely on the detail provided by the widest view will fail. Strategy must be developed based on the weakest link in the chain not the strongest. Failure to take into account local, state and federal limitations assures a cascade of problems as responses become more complex.

A. HOMELAND SECURITY

On October 8, 2001, President Bush created the Office of Homeland Security with the purpose of unifying the functions of several federal agencies under a single mission to protect our homeland. The National Strategy for Homeland Security was then developed in July 2002 as a foundation to direct local, state and federal agencies in their planning efforts for protecting the homeland. In November 2002, the President signed the Homeland Security Act of 2002, which established the Department of Homeland Security. The strategy demands that homeland security be a “concerted national effort to prevent terrorists’ attacks within the United States, reduce America’s vulnerability to terrorism, and minimize the damage and recover from attacks that do occur.”⁴⁰ The Strategy aligns the functions of homeland security into six critical mission areas: (1) intelligence and warning (2) border and transportation security (3) domestic counterterrorism (4) protecting critical infrastructure (5) defending against catastrophic terrorism and (6) emergency preparedness and response. When the strategy was unveiled it made clear that public health sectors are to be specifically involved with:

- protection of the food, water and public health critical infrastructures
- surveillance for defending against catastrophic threats
- quick and effective response with other first responders⁴¹

⁴⁰ *National Strategy for Homeland Security*, 72, 4.

⁴¹ *Ibid.*

Agencies must be prepared to prevent, protect, respond and recover from a wide spectrum of major events. A response will, no doubt, require a unified and coordinated national approach. To address this need, on December 17, 2003, President Bush issued Homeland Security Presidential Directive 8 (HSPD 8): National Preparedness. The purpose of the directive is to establish policies, procedures and goals that strengthen the preparedness of the United States to prevent, deter, respond to, and recover from terrorist attacks, major disasters, and other emergencies in an all hazards context. In HSPD 8, *all hazards preparedness* is defined as the “existence of plans, procedures, policies, training, and equipment necessary at the Federal, State, and local level to maximize the effectiveness of a multi discipline response effort.”⁴² Aligned with HSPD 5: Management of Domestic Incidents, three national initiatives were introduced 1) the National Response Plan (NRP) which defines *what needs to be done to manage an incident*; 2) National Incident Management System (NIMS) which defines *how it needs to be done* and 3) the National Preparedness Goal which *defines how well a response needs to be done*.⁴³ Together, these three initiatives enabled the nation to begin answering these questions: How prepared do we need to be?” “How prepared are we?” and “How do we prioritize efforts to close the gap?”⁴⁴

The basic premise of the NRP is that incidents are generally handled at the lowest jurisdictional level possible. Police, fire, public health and medical, emergency management, and other personnel are responsible for incident management at the local level. The NRP incorporates best practices and integrates them into a unified coordinating structure. It is built upon NIMS and provides mechanisms for the coordination and implementation of a wide variety of incident management and emergency assistance activities. There are fifteen emergency support functions (ESF) public health being responsible for ESF 6: Mass Care, Housing & Human Services and

⁴² George W. Bush, *Homeland Security Presidential Directive/HSPD-8: National Preparedness* (Washington, D.C: White House Office of the Press Secretary, 2003), 7, <http://knxup2.hsd1.org/homesecc/docs/whitehouse/nps05-121803-02.pdf> (accessed February 4, 2006).

⁴³ *National Response Plan*.

⁴⁴ *Homeland Security Presidential Directive/HSPD-8: National Preparedness*, 7.

ESF 8: Public Health and Medical Services.⁴⁵ Initial safety efforts focus on actions to detect, prevent, or reduce the impact to public health and safety. Such actions can include environmental analysis, plume modeling, evacuations, emergency sheltering, air monitoring, decontamination, emerging infectious disease tracking, emergency broadcasts, etc. These efforts may also include public health education; site and public health surveillance and testing procedures; and immunizations, prophylaxis, and isolation or quarantine for biological threats coordinated by HHS and state and local public health officials. The safety and health of responders is also a priority. Actions essential to limit their risks include assets and expertise; risk assessments based upon timely and accurate data and situational awareness that considers responder and recovery worker safety.⁴⁶

B. CENTERS FOR DISEASE CONTROL

In response to the mission of DHS, the Centers for Disease Control and Preparedness (CDC) adopted an *all hazards* approach to public health preparedness. All hazards refers to the process of optimizing and strengthening preparedness and response elements common to all emergencies whether the event is natural or man made. For example: the elements of disease surveillance used to detect West Nile Virus, measles or influenza are identical to those that will be used in an influenza pandemic, a SARS outbreak or a biological attack. Most of the differences that would be seen in a response are in the scale of each unique problem event rather than in the technical analysis techniques required for each.

As a result of the anthrax attack, the Public Health Security and Bioterrorism Act of 2002 allocated close to \$1 billion to improve state and local public health capabilities.⁴⁷ CDC used the money to establish a Public Health Emergency Preparedness “Cooperative Agreement” to aid state and local governments in their efforts

⁴⁵ *National Response Plan*.

⁴⁶ *National Response Plan*.

⁴⁷ *Public Health Security and Bioterrorism Preparedness and Response Act of 2002*, Public Law 107-188, (2002), http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=107_cong_public_laws&docid=f:publ188.107.pdf.

of bioterrorism preparedness and planning. Each state was required to submit a bioterrorism plan to include a focus on six core areas:

- (1) Communications and Information Technology
- (2) Education and Training
- (3) Laboratory capacity for biologic agents
- (4) Preparedness planning and readiness assessment
- (5) Risk communications and health information
- (6) Surveillance planning and readiness assessment

In 2005, the focus area format was replaced by an all hazards approach stressing nine preparedness goals. The preparedness goals align program activities, tasks, and deliverables with Homeland Security's mission to prevent, protect, respond and recover from an event whether manmade or natural disaster. The goals are designed to measure urgent public health system response parameters that are directly linked to health protection of the public.⁴⁸ They are intended to support the NRP and NIMS as well. This includes the planning and coordination of public health preparedness against bioterrorism, early detection of outbreaks of infectious disease, and response to public health threats and emergencies. In terms of linking the preparedness goals, DHS, CDC and NJDHSS were just in time as developing reports about bioterrorism preparedness efforts were being evaluated.

In its third annual report titled *Ready or Not? Protecting the Public's Health from Disease, Disasters and Bioterrorism*, a panel of twenty experts participated in the study for the purpose of grading federal and state bioterrorism preparedness efforts. Overall federal public health and bioterrorism performance received a grade of D+ and nearly 85% of states received a score of six or less of ten possible indicators.⁴⁹ Interesting, New Jersey received a five in 2004 and a seven in 2005 due to enhancing its laboratory

⁴⁸ Centers for Disease Control and Prevention, "Continuation Guidance for Cooperative Agreement on Public Health Preparedness and Response for Bioterrorism," Department of Health and Human Services, Centers for Disease Control and Prevention, <http://www.bt.cdc.gov/planning/continuationguidance> (accessed March 5, 2006).

⁴⁹ Trust for America's Health, *Ready Or Not?: Protecting the Public's Health from Diseases, Disasters, and Bioterrorism* (Washington, DC: Trust for America's Health, 2005), 79, <http://healthyamericans.org/reports/bioterror05/bioterror05Report.pdf> (accessed February 4, 2006).

capabilities. Five years after September 11 the expert panel concluded that the federal government's greatest failing was a complete absence of a defined set of cooperative agreement accountability indicators.⁵⁰ This is an important statement because it sets the stage for CDC to align the goals with DHS strategy to prevent, detect, recover and improve preparedness.

The CDC Preparedness Goals⁵¹ are as follows:

- Prevent:**
- (1) Increase the use and development of interventions known to prevent human illness from chemical, biological, radiological agents, and naturally occurring health threats.
 - (2) Decrease the time needed to classify health events as terrorism or naturally occurring in partnership with other agencies.
- Detect/Report:**
- (3) Decrease the time needed to detect and report chemical, biological, radiological agents in tissue, food or environmental samples that cause threats to the public's health.
 - (4) Improve the timeliness and accuracy of information regarding threats to the public's health as reported by clinicians and through electronic early event detection, in real time, to those who need to know.
- Investigate:**
- (5) Decrease the time to identify causes, risk factors, and appropriate interventions for those affected by threats to the public's health.
- Control:**
- (6) Decrease the time needed to provide countermeasures and health guidance to those affected by threats to the public's health.
- Recover:**
- (7) Decrease the time needed to restore health services and environmental safety to pre-event levels.
 - (8) Increase the long-term follow-up provided to those affected by threats to the public's health.

⁵⁰ Trust for America's Health, *Ready Or Not?: Protecting the Public's Health from Diseases, Disasters, and Bioterrorism* (Washington, DC: Trust for America's Health, 2005), 79, <http://healthyamericans.org/reports/bioterror05/bioterror05Report.pdf> (accessed February 4, 2006).

⁵¹ Department of Health and Human Services, *Cooperative Agreement Guidance for Public Health Emergency Preparedness*, 2005), <http://www.bt.cdc.gov/planning/guidance05/pdf/annoucement.pdf> (accessed February 26, 2006).

Improve: (9) Decrease the time needed to implement recommendations from after-action reports following threats to the public's health.

C. NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES (NJDHSS)

The New Jersey Department of Health and Senior Services (NJDHSS) that sets policy and standards for statewide public health programs; regulates and licenses health care facilities, practitioners and public health professionals; maintains a bio level three laboratory; administers various grants for public health programs and collects and analyzes communicable disease data. In 1997, New Jersey made a commitment to the citizens and the public health community to enhance the public health infrastructure at the local level for bioterrorism preparedness. Approximately \$16,107,770 was awarded to NJDHSS and immediately allocated to build a public health infrastructure by strategically positioning twenty-two Local Information Network Communication System (LINCS) public health agencies throughout the state. This was the beginning of the process of bioterrorism preparedness and enhancing the public health infrastructure.

Planning countywide response to public health emergencies including bioterrorism continued and on January 16, 2001, the New Jersey Commissioner of Health sent a letter to all local health officers urging them to continue their efforts in planning and preparedness. In her letter, Commissioner Grant stated "with the emergence of new pathogens and possible terrorist attack this effort will help identify, strengthen and integrate the role of public health in responding to other wide-scale emergencies."⁵² Five years later, bioterrorism planning has advanced but the role of public health is questionable in an integrated response. Despite good intentions, the plans have not worked. Instead, the new response structures, created by the NJDHSS, further duplicated and complicated an already convoluted public health communication system. Instead of partnering with the existing emergency management response structure, the NJDHSS is supplanting the emergency response system by requiring public health communications and response to flow to and from a newly established health command center (HCC) instead of the traditional New Jersey Office of Emergency Management (NJ OEM)

⁵² Christine Grant to New Jersey Health Officers, January 16, 2001.

communication where representatives of all agencies have been assigned to the emergency operation center (EOC). The HCC creates a parallel public health silo alongside NJOEM. Further complicating this issue is another NJDHSS creation, the regional Medical Coordinating Center (MCC). The initial intent of the MCC is to provide a clear picture of hospital surge capacity and public health responses. It is unclear, however what the role of the MCCs will be but as the planning efforts continue, it appears these centers will be developing additional policies on public health/hospital response procedures. The fear is that new channels now force responders to repeat messages three times to assure that information reaches the appropriate receptor. What remains to be seen is how the system will respond to the contradictory commands.

The 2005 NJDHSS budget reported two significant objectives that support the DHS and CDC missions of protecting the nation. They are:(1) prepare New Jersey to rapidly detect, identify, and respond to health-related aspects of biological, chemical, radiological, nuclear, explosive, and incendiary acts of terrorism as well as natural disasters and disease outbreaks and (2) strengthen New Jersey's public health infrastructure by adopting and implementing best practice standards, creating a comprehensive communications system that links health care providers and institutions statewide, and form a coordinated disease surveillance and response network.⁵³

In New Jersey there are two significant public health mandates that provide LHAs operational direction when enforcing or reporting progress in public health within their jurisdictions. These mandates are known as: 1) Local Core Capacity for Bioterrorism Preparedness or Attachment C and 2) Public Health Practice Standards for Local Boards of Health or Practice Standards. Attachment C is the New Jersey version of the CDC Preparedness Goal Grant with very few changes except to add several more activities for LHAs to fulfill in the grant requirements. The seven LINCS staff is tasked with ensuring that the preparedness goals are met in accordance with the expectations of the NJDHSS.

⁵³ New Jersey Department of Treasury, Office of Management and Budget, "Health and Senior Services: Department of Health and Senior Services Overview" in *State of New Jersey Budget FY 2005-2006* (Trenton, NJ: State of New Jersey, Department of the Treasury, Office of Management and Budget, 2005), D-133-D-164, <http://www.state.nj.us/treasury/omb/publications/06budget/pdf/46.pdf> (accessed February 26, 2006).

Practice Standards, on the other hand, are enforced by 114 local health agencies throughout the state. It is understood that the staff of each agency can be used in a “dual use” role. However, this approach has recently created tension among public health agencies because certain positions require specific certification, skills and training. Ongoing tensions exist as to whether LINCS should be responsible for *ensuring* practice standards as well as bioterrorism planning without funding and with the same core positions.

1. Local Core Capacity Infrastructure for Bioterrorism Preparedness

The primary purpose of Attachment C is “to enhance and integrate local public health agencies’ state of preparedness to acts of terrorism and other public health emergencies.”⁵⁴ There are two critical priorities of this grant: 1) minimize, to the fullest extent possible, the human health consequences associated with the emergence of a novel strain of influenza virus (Flu Pandemic Planning) and 2) greatly expand capacity to expeditiously and efficiently distribute/administer antibiotics and/or vaccine to the entire population at community-based points of distribution (PODS) or other methods.⁵⁵

The preparedness goals provide focus in reaching the priority objectives while following the all hazards approach and not compromising preparedness efforts for other types of emergencies. Coordination and collaboration between local, county and state agencies is critical to New Jersey’s application of the national preparedness standards by using the CDC Preparedness Goals in order to measure public health response and performance. There are nine goals with many Required Critical Tasks (RCT) LINCS agencies are expected to perform. Each goal, outcome, method to accomplish the goal and required critical task (RCT) are described in Table 1 below. In summary, the tasks below are a monumental task for LINCS agencies because they are also being asked to assist the local public health agencies in their efforts of providing essential health services.

⁵⁴ *Local Core Capacity Infrastructure for Bioterrorism Preparedness*, Vol. 06-1165-BT-L-1 (New Jersey, 2005).

⁵⁵ Ibid.

Table 1
Preparedness Goals for the State of New Jersey 2005-2006

Goal	Outcome	Method	Required Critical Task Number
1	Prevent	Increase the use and development of interventions known to prevent human illnesses from chemical, biological, radiological agents, and naturally occurring health threats	...
1A	Prevent	All-Hazards Planning Decrease the time needed to classify health events as terrorism or naturally occurring in partnership with other agencies	10
2	Prevent		...
2A	Prevent	Information Collection and Threat Recognition	5
2B	Prevent	Hazard and Vulnerability Analysis Decrease the time needed to detect and report chemical, biological, radiological agents in tissue, food, or environmental samples that cause threats to the public's health	3
3	Detect/Report		...
3A	Detect/Report	Lab Testing Improve the timeliness and accuracy of information regarding threats to the public's health	...
4	Detect/Report		...
4A	Detect/Report	Health Intelligence Integration and Analysis Decrease the time to identify causes, risk factors, and appropriate interventions for those affected by threats to the public's health	4
5	Investigate		...

Table 1
Preparedness Goals for the State of New Jersey 2005-2006

Goal	Outcome	Method	Required Critical Task Number
5A	Investigate	Public Health Epidemiological Investigation	5
6	Control	Decrease the time needed to provide countermeasures and health guidance to those affected by threats to the public's health	...
6A	Control	Emergency Response Communication	6
6B	Control	Emergency Public Information	4
6C	Control	Worker Health Safety	9
6D	Control	Isolation and Quarantine	5
6E	Control	Mass Prophylaxis and Vaccination	6
6F	Control	Medical and Public Health Surge	4
7	Recover	Decrease the time needed to restore health services and environmental safety to pre-event levels	...
7A	Recover	Economic and Community Recovery	4
8	Recover	Increase the long term follow up provided to those affected by threats to the public's health	2
9	Improve	Decrease the time needed to implement recommendations from the after actions reports following threats to the public's health.	3
9A	Improve	Cities Readiness Initiative (CRI)	4

Table 1
Preparedness Goals for the State of New Jersey 2005-2006

Goal	Outcome	Method	Required Critical Task Number
9B	Improve	Strategic National Stockpile (SNS) plan to receive and distribute medication within 48 hours	4

Note: ...: Indicates not applicable

Table 1. Preparedness Goals for the State of New Jersey

2. Public Health Practice Standards of Performance for Local Boards of Health

Public Health Practice Standards of Performance for Local Boards of Health (LBOH), or Practice Standards, promulgated by the NJDHSS, Division of Local Health and Emergency Services were adopted by the state Public Health Council as the model system to provide local public health activities. Practice Standards, referred to as N.J.A.C. Chapter 8:52 were adopted December 30, 2002 and made effective February 18, 2003. The law sunsets on February 18, 2008 unless readopted. On May 1, 2003, the Commissioner of Health, Dr. Clifton Lacy, circulated a letter to every municipal mayor and governing body, each Health Officer and more than 500 LBOH to announce the adoption and implementation process for practice standards. In the letter, Dr. Lacy says “the rules will serve as a blueprint in the building of a strong governmental public health infrastructure indicated by the 1988 and 2003 IOM reports to more effectively protect and promote the public’s health and well-being.”⁵⁶ The standards are intended to “assure the provision of a modern and manageable array of public health services to all citizens of New Jersey.”⁵⁷

⁵⁶ Dr. Clifton R. Lacy to New Jersey Health Professionals, May 1, 2003.

⁵⁷ *Public Health Practice Standards of Performance for Local Boards of Health in New Jersey*, Public Law Chapter 52 (2003): 8:52-1, http://www.state.nj.us/health/lh/chapter_52.pdf (accessed July 17, 2005).

“The standards mandate cooperation among community partners, public and private care givers in recognition of the lack of infrastructure in the public health system.”⁵⁸ This places responsibility for interagency cooperation squarely on the LHA, which has no authority to carry out this mission or ability to influence outside agencies. Partnerships within the community are well accepted by the local health officer but partners operating in a profit environment have no incentive to invest in programs sponsored by the LHA and those that operate in a non-profit environment have limited resources to commit.

The core component of the practice standards includes performance monitoring and evaluation of local programming and services. LHAs are expected to conduct community surveys, health risk assessments, conduct resource inventories and form public health partnerships with outside agencies and disciplines. Despite these expectations, there is limited support and targeted funding to make cooperation happen. NJDHSS provides guidance in the form of increasingly detailed reporting processes. Most state employees, who have programmatic oversight over the LHAs’ components, lack local health experience. The result is a set of guidelines that are excessively restrictive and burdensome and are oblivious to the resource limitations of the system they govern.

The concept of articulating program guidelines for local public health activities is a NJDHSS tradition. Practice Standards do not deviate from the State custom of stipulating increasingly detailed program requirements. Practice Standards enumerates an array of what are euphemistically called “minimum” public health programs and capacities in a detailed series of 16 chapters. Each of the core staff positions has corresponding responsibilities enumerated in Practice Standards; these mandates are imposed on every LHA regardless of population base or staffing levels.

Prior to the adoption of Practice Standards the NJDHSS promulgated program guidelines called “Minimum Standards of Performance for Local Boards of Health.”

⁵⁸ *Public Health Practice Standards of Performance for Local Boards of Health in New Jersey*, Public Law Chapter 52 (2003): 8:52-1, http://www.state.nj.us/health/lh/chapter_52.pdf (accessed July 17, 2005).

Minimum standards contained a series of quantifiable program performance objectives. These performance objectives were adopted into the Appendix to the Practice Standards and entitled “Guidelines for Best Practices.” Incorporated into the Practice Standards (see Appendix in “Guidelines for Best Practices”) was the original 1980s era “Adult Health Services Guidelines.” Copies of this document are no longer in circulation but can be obtained from NJDHSS. It is important to note that since all the old guidance requirements are incorporated in the new standards (in addition to new program mandates) the requirements continue to expand with each new iteration of program guidelines.

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IV. PUBLIC HEALTH INFRASTRUCTURE IN NEW JERSEY

The population of New Jersey is over eight million people. It is the most densely populated state in the Union (1,030 people per square mile) thirteen times the national average.⁵⁹ New Jersey has an extensive system of highways and railroads as well as one of the largest seaports in the US. It is highly industrialized with ninety of the nation's 100 largest companies. New Jersey has the most malls in one twenty-five square-mile area and has the most diners in the world.⁶⁰ These facts illustrate the challenges public health are faced with when protecting the health and safety of the community.

There are twenty-one counties, 566 municipalities and a public health system consisting over 500 Boards of Health (BOH), one hundred and fourteen (114) independent LHAs, and the twenty-two LINCS agencies. Many public health officials express frustrations about their inability to address their dual role in both the traditional public health duties and the secondary bioterrorism planning capacity.

A. LOCAL HEALTH AGENCY (LHA)

In New Jersey, a local health agency (LHA) is defined as a county, regional, municipal or other governmental agency organized for the purpose of providing health services, administered by a full-time health officer and conducting a public health program pursuant to law.⁶¹ LHAs are established by state statute and local ordinance and operate under a "Home Rule" format. Home rule grants municipalities partial autonomy of self government under which they manage their own affairs, in accordance with the Constitution. Under home rule, there is a tendency to duplicate services and workforces within relatively small geographic areas in a given region, i.e. each municipality has a school system, library, police department, fire department, public works department, etc., each with their own administrative and supervisory structure, capital requirements, pension obligations, and health insurance premiums. Despite this inherent duplication of

⁵⁹ "New Jersey: Fast Facts and Trivia," <http://www.50states.com/facts/newjersey.htm>

⁶⁰ Ibid.

⁶¹ *Public Health Practice Standards of Performance for Local Boards of Health in New Jersey*, 8:52-1-8:52-28.

services, the public health community has not benefited from a glut of resources. One problem with home rule is that local health agencies serve population bases that are too small to financially support the level of service required by federal and state mandates. To solve this problem, many agencies currently resort to contracted labor, part-time positions or employees being utilized in a dual role capacity. The result is a pool of public health personnel being shared by multiple agencies or across disciplines. This works passably when there is no undue stress on the system but is easily and quickly overwhelmed with even small scale events. In an emergency, part time employees will be expected to discharge full time duties in more than one municipality, simultaneously

B. LOCAL INFORMATION NETWORK COMMUNICATION SYSTEM (LINCS)

New Jersey lacks a consistent definition for LINCS agencies. According to NJ Practice Standards, LINCS is “a network of public health agencies which are interconnected with the Department through an electronic public health information system that is built on personal computer and internet technologies”⁶² In October 2005, New Jersey Legislature passed the Emergency Model Health Powers Act in times of declared public health emergencies. The Act defines LINCS as “the lead local public health agency in each county or identified city responsible for providing central planning, coordination and delivery of specialized services in partnership with the other local health agencies in order to prepare for and respond to acts of bioterrorism and other forms of terrorism or other public health emergencies or threats.”⁶³

Since the inception of LINCS, roles and responsibilities for coordination with LHAs were always vague. LINCS started as a simple email system. It has evolved into “the lead public health agency” in every county throughout the state. This evolution occurred without considering the existing legal structure and authority of LINCS employees within their counties. The NJDHSS is misleading the CDC as they insist they are reaching out to “local” public health departments when in fact, they are only reaching

⁶² *Public Health Practice Standards of Performance for Local Boards of Health in New Jersey*, 8:52-1-8:52-28.

⁶³ *Emergency Health Powers Act*, Public Law Public Law 205, Chapter 222, (2005), http://www.njleg.state.nj.us/2004/Bills/PL05/222_.PDF (accessed February 26, 2006).

out to the 22 LINCS and bypassing the remaining 114 local health agencies. It is LINCS Health Officer's who are required to be present on BT planning and Practice Standards discussions while reaching out to a *select* few of the 114 LHAs. Today, the goal and vision of LINCS is to facilitate a regional response by enhancing the public health infrastructure.⁶⁴ LINCS is asked to fill in the gaps of providing essential health services. On paper, the state enhanced the public health infrastructure by funding the core positions, but this was negated by the increased workload from the CDC mandates that were imposed at the same time while now being asked to meet the requirements of practice standards.

A recent example of the workload dilemma was witnessed in April 2005 when New Jersey hosted the congressionally-mandated international terrorism exercise known as TOPOFF3 (T3). T3 was designed to identify vulnerabilities in the State of New Jersey by exercising the plans, policies, procedures, systems and facilities of federal, state, and county/local response organizations against a biological attack. The scenario was a bioterrorist attack using *pneumonic plague* as the agent. This was New Jersey's first public health exercise and lessons learned have indicated the need for public health to be integrated into the traditional emergency management system. Officially, the public health agencies met the expectations of the week long exercise. However, in reality, the manpower needs were filled by mobilizing "notional" resources, interpreted as using imaginary public health workers to meet the expectations of the exercise. No serious effort was made to determine where these public health workers would come from to fulfill these manpower needs. LINCS was responsible for opening points of dispensing (PODS) to provide mass prophylaxis for the entire county. One epidemiologist was expected to conduct case contact disease investigations for more than 19,000 victims and participate in all public health/law enforcement responses. It was an overwhelming task that neither the NJDHSS, the LHAs, nor LINCS was equipped to accomplish. We are in the same predicament now as we prepare for an influenza pandemic response. When we are no longer doing practice exercises, it will become necessary to find thousands of real people to staff these "notional" positions used during the exercises. There are no

⁶⁴ *Local Core Capacity Infrastructure for Bioterrorism Preparedness.*

guidelines or plans for finding these people or training them to do the required tasks. In point of fact, NJ does not have enough manpower to meet its needs as demonstrated by the exercise, but officials ignore this lesson as they engage new plans based on old assumptions.

C. RESPONSIBILITIES OF LOCAL PUBLIC HEALTH PERSONNEL

The Practice Standards specify certain core staff positions needed to accomplish the public health objectives. The minimum staff positions for a local health agency are:

- *Health Officer* - a licensed professional responsible for overall administration the public health program and compliance with all mandated activities
- *Public Health Nurse* - is a licensed professional position that conducts the personal health programs of the LHA
- *Health Educator* - Certified Health Educator Specialist (CHES) who conducts health education programs designed to encourage lifestyle modifications that will eliminate or reduce risk factors of chronic diseases
- *Registered Environmental Health Specialist* - (REHS) is a licensed professional position who conducts the environmental program including investigations and enforcement of applicable laws and statutes
- *Epidemiologist* - (EPI) is specially trained to investigate reportable disease cases and conduct infectious disease surveillance
- *Information Technology* - Specialist (IT) to maintain computer operating systems including information transfer and web-based programs to assure interoperability with local, state and federal systems
- *Public Health Planner* - a state employee assigned to the LHA to ensure consistency among county work plans and programs.

The responsibilities of the Health Officer, as chief administrator of the LHA, are very broad and are incorporated into more than half of the Practice Standard subchapters. The Health Officer is responsible for defining the programs and capacities that are necessary to deliver population based services. Program areas incorporate the three core functions of public health and the 10 essential public health services. They include: providing access to expertise in the areas of planning, health education, epidemiology, IT management, training and staff development, prevention and control of communicable diseases and emergency preparedness planning, assuring 24/7 emergency response capability in accordance with state, county and federal requirements.

The administrative functions include planning and management roles, which incorporate the Assessment Protocol for Excellence in Public Health (APEX) as the management tool required by NJDHSS. Additional mandates include: assurance of workforce competency, fiscal responsibility, and continuous quality assurance, completion of the NJDHSS annual reports including the Local Health Evaluation Report (LHER), the Board of Health registration and completion of the Community Health Improvement Plan (CHIP).

Each LHA is required to participate in community health partnerships and assure that public health needs within their jurisdiction are properly addressed. Together with the Partnership Coordinator, the Health Officer is responsible for the development of a regional coalition of health providers. This coalition will provide the “efficient, unrestricted, systematic delivery of recognized, qualified public health services.”⁶⁵ For the purpose of this research the partnership coordinator position is not evaluated simply because it is not a recognized public health position and in Union County the partnership coordinator role is filled by a committee of health officer’s and LINCS staff called the governmental public health partnership.

The Health Officer monitors the health of the community by collecting and recording vital statistics and analyzing health status measures. The Health Officer must also participate in a county wide Community Health Assessment conducted according to the Mobilizing for Action through Planning and Partnerships (MAPP) methodology. Policy Development is also a Health Officer responsibility requiring development and tracking of measurable health objectives, policies to govern prevention and treatment services and recommend the adoption of model public health laws. The Health Officer is responsible for identifying the community’s health needs and incorporating an improvement plan into the CHIP. This evaluation must address a systematic review of the effectiveness, accessibility, and quality of population-based health services. The Health Officer is responsible for assuring workforce competency by assessing existing staff competency, identifying gaps in expertise and ensuring proper manpower resources

⁶⁵ *Public Health Practice Standards of Performance for Local Boards of Health in New Jersey*, 8:52-1-8:52-28.

exist to deliver mandated services needed to achieve public health program objectives. Finally, the Health Officer must diagnose and investigate health problems and hazards and assure that there is a mechanism in place to provide disease surveillance and epidemiology services with access to a qualified public health laboratory.

The Public Health Nurse is required to develop written policies that incorporate the 10 core public health functions into a comprehensive nursing program. He/She must facilitate community outreach and health assessment. The Nurse must integrate epidemiology into the case identification/treatment continuum. He/She will direct health guidance and counseling, as well as primary clinical prevention and early intervention strategies (screenings, preventive care, immunization etc). Public Health Nursing is the delivery system for personal health services. The individual program features are specified in detail in the Best Practices appendix and are reported in the LHER. Program requirements include:

- Communicable Disease Activities
 - a. Reportable Diseases – surveillance and investigation of communicable diseases and identification and early detection of outbreaks.
 - b. Immunization – promote vaccination against vaccine preventable diseases in infants, school age children and adults.
 - c. Tuberculosis control – provide TB control services to include diagnosis and treatment, routine testing, case contact follow-up and preventative therapy.
 - d. Sexually Transmitted Diseases – diagnosis, treatment, reporting and investigation of STDs, counseling and preventative education.
 - e. HIV – administer a planned program to prevent & control HIV infection to include counseling and referral to treatment and social service agencies.
- Maternal and Child Health activities
 - a. Infants and preschool – health supervision for infants and pre-school children to include preventative health care, developmental monitoring, outreach to health care providers with emphasis on medically indigent.
 - b. Childhood Lead poisoning – prevention and control of lead poisoning in children to include, education, screening, diagnosis, environmental management and treatment.
 - c. Improved Pregnancy Outcome – public health nursing services to provide pre-natal care, information and counseling, referral and outreach to high risk women including adolescents.

- Adult Health Services
 - a. Cancer services
 1. Cervical – 3% of women 15 – 34 and 3% of women 35 – 64 at high risk, and education yearly for 5% of women 15 and older in, risk factors for cervical and breast cancer, importance of PAP, and importance of breast screening including mammography
 2. Colorectal – screening 3% of people over 40 for risk factors
 - b. Diabetes risk assessment
 - c. Cardiovascular disease – hypertension screening of 1% of high risk population, risk factor assessment for people with high blood pressure

The Health Education/Risk Communicator (HERC) is responsible for designing a comprehensive health education and health promotion program “designed to facilitate behavioral and environmental adaptations to protect and improve health.”⁶⁶ This program must be “culturally and linguistically appropriate and fully integrated into the daily LHA program.”⁶⁷ The HERC must assure that the ten essential health services are represented in the health education programs and that each has an evaluative component. It is necessary to include referral to assistance and social service resources. The HERC is responsible for inventory of every health education program in their jurisdiction.

The health education program is a structured education program including components for alcohol abuse, drug abuse, smoking prevention and cessation, nutrition, physical fitness and exercise that are targeted at specific risk factors and populations at risk. It is critical that these programs be evaluated for effectiveness. Components contained in the Best Practices appendix are: cardiovascular education for the general public, health education and promotion services for older adults with yearly health needs assessment, alcohol abuse and medication management, provide gerontology education for staff, colo-rectal cancer education to risk factors and prevention to 3% of people over 40, diabetes services education, smoking prevention programs, physical fitness, and drug awareness programs.

⁶⁶ *Public Health Practice Standards of Performance for Local Boards of Health in New Jersey*, 8:52-1-8:52-28.

⁶⁷ *Ibid.*

The Registered Environmental Health Specialist (REHS) core position mandates that LHAs design systems to protect against and prevent environmental conditions that contribute to adverse health outcomes. Key to this objective is the assessment of environmental health risks and implementation of proactive preventative programs and systems. The REHS serves in the traditional public health inspector role and is responsible for the enforcement of public health laws. It is crucial to integrate enforcement of state and local ordinances with modern law enforcement procedures for evidence collection and case documentation. The mandated components of the environmental health program are:

- Recreational bathing – regular bacteriological testing, safety and sanitation inspection twice annually, accident investigation
- Campgrounds – annual inspection for compliance with state code
- Food surveillance – annual inspection of retail food establishments, food borne illness investigation compliance with state sanitary code
- Occupational Health – maintain records on local employers, investigate occupational diseases, train one staff member in Industrial Hygiene
- Public health nuisances – investigate and abate public health nuisances involving insect and rodent control, solid waste, housing and noxious weeds
- Rabies and Zoonoses diseases-communicable from animals to man.
- Control rabies vaccination and animal bite investigation and animal control

The Epidemiologist core position is charged with both the analytic and descriptive components of disease surveillance and outbreak investigation. The Epidemiologist monitors population health status, identifies and investigates health problems and studies the distribution, and determinants of factors that influence the health of the population. In a LHA, the Epidemiologist is critical to disease surveillance and outbreak recognition. Once a disease is identified, the epidemiologist will investigate the source of the disease; identify vulnerable populations and direct remedial actions.

The Medical Director assures preventive and personal health services are available to the public. This health care must be “culturally and linguistically appropriate” with both materials and staff to provide epidemiological follow-up, adult and childhood immunizations, with special provisions for in medically underserved or vulnerable populations.

The Information Technology staff is required to maintain information technology systems that are compatible with and connected to the NJDHSS system and are secure and Health Insurance Privacy and Portability Act (HIPPA) compliant.

Each public health core position has referenced chapters in Practice Standards as well as detailed, quantifiable program guidelines stated in the Best Practices Appendix. The Best Practices objectives are measured in a NJDHSS report called the *Local Health Evaluation Report* or (LHER). Each LHA is required to provide a quantitative assessment of its activities each year in the LHER. The purpose of the LHER is to serve as a guide to Practice Standards implementation and as an assessment tool for the local health agency's performance in the implementation of the Practice Standards.⁶⁸ The LHER contains detailed information on the number of actions conducted under each of the “Guidelines for Best Practices” categories. The LHER has a section enumerating the number of critical positions maintained by the LHA; a section documenting staff development pursuant to Practice Standards workforce competency requirements; a section listing source and amount of funding; a section on expenditures by program category; and, a subjective questionnaire measuring progress toward assessment, assurance and policy development goals. However, the LHER lacks a mechanism to measure progress against public health program objectives. This omission limits the Local Health Evaluation Report (LHER) utility and misses an opportunity to truly evaluate the LHA program effectiveness and public health infrastructure gaps.

⁶⁸ *Local Health Evaluation Report (LHER)*.

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V. CASE STUDY-UNION COUNTY, NEW JERSEY

There are twenty-one municipalities in Union County employing ten health officers, four serve multiple jurisdictions and six serve their single local jurisdiction. There is one County Health Officer responsible for ensuring an adequate and appropriate level of countywide participation and collaboration in public health preparedness and response to bioterrorism, outbreaks of infectious disease and other public health threats and emergencies. The population in Union County is 522,541 in 100 square miles with only forty-seven public health employees within the ten local health departments. This represents a ratio of nine *public health workers per 100,000 populations*. “Nationally, the ratio of public health workers to the population has dropped from 219 per 100,000 in 1980 to 158 per 100,000 in 2,000.”⁶⁹ Based on this statistic, Union County is well below the national average in the public health workforce. Their primary function is preventing disease. Unfortunately, the leading causes of death in the county as well in the New Jersey are heart disease, followed by cancer, stroke, chronic respiratory disease and diabetes. Death rates for all but stroke are lower than the state rates. The death rates from chronic illnesses are typical for the region but these adverse outcomes represent the failure of public health to address lifestyle issues and health screens that are mandated by state and federal agencies. Table 2 details the demographics in Union County, NJ. Tables 3 through 6 identify the four core public health positions performance workload. The performance provides a comparison of mandated public health program targets and LHD performance as self-reported by local health officers in their 2004 LHER reports. The tables are organized by the primary job function of the activity.

A. DEMOGRAPHICS

Union County is home to the Elizabeth Port (the second largest seaport in the country), major railroads and highways to include the New Jersey Transit Railroad System, The New Jersey Turnpike, Garden State Parkway and the Newark International Airport. Surrounding the county is the East Coast’s largest Petroleum Port, the largest

⁶⁹ *Public Health Security and Bioterrorism Preparedness and Response Act of 2002.*

Auto Port and neighbors the City of Newark which is the largest city in New Jersey. The significance of this is to illustrate the rich critical infrastructure and opportunities for potential exposure to natural or man made biological threats. There are several languages other than English that are native to Union County residents. These include Spanish, Polish, Russian, Creole, Italian and Portuguese, among others, creating difficulties meeting the mandated language and cultural appropriate programming. It is assumed that there is a significant undocumented foreign population living within the community. Table 2 provides base year 2000 Census information in Union County.⁷⁰

Table 2 Demographics¹ Union County, New Jersey

Union County Total Population 2000 Census (N):		522,541
	N	N ≤ 200% of Poverty²
Sex		
Male	251,372	30,165
Female	271,169	32,540
Reportable LHER³ Categories by Age and Gender		
Children ≤ 5 years of age	18,702	2,244
Children ≤ 2 years of age	14,576	1,749
Teenagers 15 - 19 years of age	31,451	3,774
Females 15 - 64 years of age	173,727	20,847
Females ≤ 20 years of age	35,776	4,293
Females ≥ 40 years of age	145,235	17,428
Males ≥ 40 years of age	146,893	17,627
Adults 22 - 61 years of age	285,766	34,292
Adults ≥ 40 years of age	146,893	17,627
Adults ≥ 50 years of age	212,651	25,518
Adults ≥ 65 years of age	117,976	14,157

⁷⁰ United States Census Bureau. *Census 2000 Demographic Profile Highlights*, 2000), <http://factfinder.census.gov> (accessed March 5, 2006).

Notes:

¹ Numbers derived from the Union County, New Jersey 2000 Census.

² $\leq 200\%$ of defined as households earning $< \$31,340$ annually as per the Department of Health and Human Services Guidelines. Reporting poverty distribution demonstrates focus of public health resources by neediest population.

³ LHER: Local Health Evaluation Report. Data were derived from the 2004 LHER Reports.

Table 2. Demographics Union County, New Jersey

Almost 14% of the population is over age sixty five, which is about 1% above the state percentage. Approximately 8.4% of the population lives below 200% of the poverty guideline (\$31,340). The synopsis of Union County Demographics is contained in Table 2. This information is needed to target segments of the population for specific public health services. The information will then be assessed as it relates to existing public health performance and is critical in estimating manpower needs in the following tables.

B. PERFORMANCE AND TARGET ACTIVITIES FOR CORE PUBLIC HEALTH PERSONNEL

Age and sex breakouts were taken directly from the 2004 census data. The use of the 200% of guideline was employed to limit the target population to a reasonable figure. It is also expected that families above the 200% of poverty guideline will be more likely to have health insurance or have regular access to health care and therefore less likely to need or utilize public health clinics. Although the 200% poverty guideline was also employed in the Older Adult Health Services target estimates, there is no way of knowing whether the delivered services were provided to that population segment or not. Seniors of all income categories typically utilize these services. The same holds for Cervical Cancer screening; these services are well established and accepted by women of all income categories.

Because of the inconsistency of data formats common to public health and the census age data and income break points, it was necessary to interpolate information such as demographics of those living at 200% of poverty guidelines, populations at risk and some targeting. Only the most recently published documents were used so as to be consistent with the time frame of the 2000 Census and the 2004 LHER. When

determining target populations, a conservative approach was used to calculate the lowest probable number rather than the highest. This may underestimate actual level of need however this serves to bias against the hypothesis proposed in this research.

In 1989 the NJDHSS published a document titled *The Adult Health Services Guidelines*. This document was adopted by reference when the Minimum Standards of Performance for Local Boards of Health was adopted in 1991. This same document is referenced in the current Public Health Practice Standards for Local Boards of Health in New Jersey. Although the document is old, the targeting objectives as well as the targeting methodology are still valid. The 1989 guidelines remain the only attempt by the NJDHSS to quantify performance objectives. Therefore all targeting figures were calculated by applying the Adult Health Services methods found on pages 36 through 38 to the 2000 census data.⁷¹ Tables 3-6 show Performance of Core Public Health Positions by Target Activities.

1. Epidemiologist

Represented in Table 3 is the core position of Epidemiologist. The comparison shows investigations compared to disease reports. Since there is only one epidemiologist employed and assigned to Union County LINCS, all investigations were conducted by staff other than the epidemiologist. All five local hospitals and each local health agency conduct limited investigations utilizing nursing and REHS staff.

Table 3
Performance for Epidemiology

		As Reported in 2004 LHER¹ Reports (N)
Activity²		
Reportable Disease Investigation		
<i>Cases (N):</i>		2,106
<i>Follow up (N):</i>		966
Communicable Diseases		
Sexually Transmitted Disease (STD)		
<i>Cases (N):</i>		539

⁷¹ New Jersey. Department of Health, *Adult Health Services: Guidelines* (Trenton, NJ: New Jersey State Department of Health, Division of Epidemiology and Disease Control,[1989]).

Tuberculosis (TB)	<i>Follow up (N):</i>	85
	<i>Cases (N):</i>	64
	<i>Follow up (N):</i>	141

Notes:

¹ LHER: Local Health Evaluation Report

² Expected numbers of disease cases is not calculated for a given year

Table 3. Performance for Epidemiology

2. Health Educator/Risk Communicator (HERC)

In Table (4) promotion programming is targeted at specific populations in need of nutrition information or at risk of alcohol, drug and tobacco abuse. Looking at the HERC performance table it is obvious that adult health education objectives are far from being met. Clearly this will impact chronic illness incidence.

Table 4
Performance and Target Activities for Health Education/Risk Communication (HERC)

Health Education Category	As Reported by 2004 LHER¹ Reports (N)	Target Activities (N)	Target Activity Completed (%)
Alcohol: Target 56.5% of adult population between 22-61 years of age			
<i>Number of Participants (5% of target population)</i>	646	8,073	8
<i>Number of sessions</i>	40	538	7
Smoking: Target 20% of adult population between 22-61 years of age			
<i>Number of Participants (5% of target population)</i>	726	2,858	25
<i>Number of sessions</i>	36	191	19
Physical Fitness: Target 22% of adult population between 22-61 years of age			
<i>Number of Participants (5% of target population)</i>	864	3,143	27

<i>Number of sessions</i>	34	210	16
Drug Abuse: Target 36% of Teen population between 15-18 years of age			
<i>Number of Participants (5% of target population)</i>	788	566	139 ^a
<i>Number of sessions</i>	37	38	98 ^a
Total Participants	3,024	14,640	21
Total Sessions	147	977	15

Notes:

¹ LHER: Local Health Evaluation Report

^a Specific drug and alcohol educational programs in one municipality contributed to the high rate of participants and sessions in 2004.

Table 4. Performance and Target Activities for Health Education/Risk Communication (HERC)

3. Public Health Nurse

Table (5) lists the best practice activities that are measured by clients served and the estimated target population that was in need of the service. The NJDHSS uses cancer education targets of 5% of the women aged fifteen to sixty four for Breast and Cervical cancer and 3% of both sexes over forty for Colo-Rectal cancer. Diabetes and cardiovascular disease targets are age and risk factor based by NJDHSS. There is a wide disparity in nursing performance among the various public health nursing program activities. The general failure to meet objectives will again impact early detection of deadly chronic illnesses.

Table 5
Performance and Target Activities for Public Health Nursing

	As Reported by 2004 LHER ¹ Reports (N)	Target Activities (N)	Target Activity Completed (%)
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Maternal and Child Health

Table 5
Performance and Target Activities for Public Health Nursing

	As Reported by 2004 LHER ¹ Reports (N)	Target Activities (N)	Target Activity Completed (%)
Infants and Preschool Children			
<i>Children Served</i>	2,420	18,702	13
<i>N ≤ 200% of Poverty²</i>	1,117	2,244	50
Childhood Lead Poisoning Prevention			
<i>Children screened: 85% ≥2 years and at ≤200% Poverty</i>	351	1,487	24
Improved Pregnancy Outcome (IPO)			
<i>Females ≤ 20 years of age receiving prenatal and post partum visits at ≤ 200 % Poverty</i>	39	482	8 ^a
Childhood Immunizations			
<i>N ≤ 200% of Poverty</i>	1,117	2,224	50
Cancer Screening and Education			
Cervical Cancer: 3% females age 15-64 years of age	378	625	60
Prostate Cancer: 5% males ≥ 40 years of age			
<i>N ≤ 200% of Poverty</i>	379	881	43
Mammography: 50 % females ≥ 40 years of age			
<i>N ≤ 200% of Poverty</i>	...	8,714	...
Education (N):	1,856	10,221	18
Adult Health and Diabetes			
Diabetes Screening Services			
<i>1% of adults ≥ 50 years of age</i>	1,092	2,127	51
Education (N)	381	2,127	18

Table 5
Performance and Target Activities for Public Health Nursing

	As Reported by 2004 LHER ¹ Reports (N)	Target Activities (N)	Target Activity Completed (%)
<i>Continued...</i>			
Adult Health and Cardiovascular Disease			
Cardiovascular Disease Screening Services			
<i>1% of adults ≥ 50 years of age</i>	3,579	2,127	168 ^b
<i>Adults initial screenings</i>	180	638	28
Education (N):	321	2,764	12
Older Adult Services: ≥ 65 years of age			
Flu Vaccine	11,920	14,157	84
Pneumonia Vaccine: 20% of Older Adults	69	2,831	2 ^c
Health Screenings: 1% of Older Adults	478	1,180	41
School Health			
Schools	169	230	73
Schools Audited	68	77	88
School Enforcement	5	...	...
Preschools	139	191	73
Preschools Audited	106	191	55

Notes:

¹ LHER: Local Health Evaluation Report; ² Poverty is equal to \$31,340

... : Indicates not applicable

^a Improved Pregnancy Outcome (IPO): This is low at 8% because typically low income teenage mothers do not seek care until at least their third trimester

^b Cardiovascular Screening in adults over 100% because senior citizens attend clinics on a regular basis and get counted multiple times.

^c Pneumonia vaccine in adults was very low because it is poorly accepted by seniors and an up front cost is involved

Table 5. Performance and Target Activities for Public Health Nursing

4. Registered Environmental Health Specialist (REHS)

Table (6) shows the Registered Environmental Health Specialist section; targets are extrapolated based on the reported performance contained in the LHER and LHA self reports. Childhood Lead Poisoning Prevention is based on published NJDHSS program goals of screening 85% of children under two years old. REHS performance is generally better than the other core positions. This may be attributable to the fact that the environmental staff position is probably the most visible position involved in complaint resolution and recognized at the local level for its value in code enforcement in upholding community standards giving it a recognized political presence.

Table 6
Performance and Target Activities Registered Environmental Health Specialist (REHS)

	As Reported by 2004 LHER ¹ Reports (N)	Target Activities (N)	Target Activity Completed (%) ^a
Bathing Places			
Inspections	75	83	90
Enforcement Actions	20	22	91
Youth Camps			
Inspections	48	60	80
Food Establishment Surveillance			
Inspections	2,459	3,026	81
Re-Inspections	556	696	80
	53		

	Complaints	453	545	83
	Enforcement Actions	123	151	81
Public Health Nuisances				
	Inspections	5,086	5,984	85
	Complaints	4,731	5,566	85
	Enforcement Actions	398	468	85
Childhood Lead Poisoning Prevention				
	Environmental Investigations	288	466	62
	Confirmed Positive	39	92	42
	Residences Abated	40	92	43
Rabies and Zoonosis Control ²				
	Animal Bite Investigation ³	1,280	...	...
	Pets Shops Inspected	9	9	100

Notes:

¹ LHER: Local Health Evaluation Report

² Zoonosis: Diseases transmitted from animals to humans

³ Number of animal bite investigations are not estimated for a given year

...: Indicates not applicable

Table 6. Performance and Target Activities Registered Environmental Health Specialist (REHS)

C. GAP ANALYSIS OF CORE PUBLIC HEALTH FUNCTIONS

When the delivered services are compared to the targeted services, the reader becomes aware of the gap between the desired performance level and the actual performance level. It is evident that the existing public health infrastructure in Union County is inadequate to reach the minimum service levels identified by NJDHSS. The gap is most evident in the health education and public health nursing. There is an intuitive link between the chronic illness death rate and the lack of health education

programming. Early detection of chronic illnesses is a key to minimizing the adverse health impacts. This is a function of public health nursing and chronic illness screening. Another key to chronic illness prevention is lifestyle interventions that eliminate risk factors that influence chronic illness development. This is a function of health education. If an adequate investment had been made in health education in 1989 when the Adult Health Guidelines were published, would we have been able to reduce the current death rate? There is no way to answer that question with any certainty. However, public health practitioners would be hard pressed to answer in the negative. The gaps in program performance we see in the tables can be directly attributed to manpower deficiencies and clearly show that not only do we lack the reserve capacity mentioned by Klitzman and Freudenberg, but we are not staffed at minimum levels. When fire fighters are not fighting fires they are engaged in training, fire prevention inspections and education programs. These activities allow them to reduce the incidence of fires and therefore spend more time preventing them. Public health lacks this manpower luxury.

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VI. MANPOWER ESTIMATES FOR PUBLIC HEALTH COMPLIANCE

A. MANPOWER METHODOLOGY TOOL

The State Health Department web site contains a formula that enables health officers and Board of Health members to estimate the Registered Environmental Health Specialist manpower needs.⁷² Utilizing the formula in Appendix 1, we arrive at an annual work year of 983 hours for REHS and 1313 hours for the remaining core positions. These two numbers differ because travel is a significant portion of the REHS workday, where the others have limited expected travel time. Further, dividing the manpower year by the number of hours needed to meet target performance levels, we can determine the optimal manpower level for each position. Tables (7) through (11) estimate manpower needs the by Core Public Health Positions to comply with the NJ Public Health practice Standards.

B. MANPOWER ESTIMATES FOR COMPLIANCE WITH PUBLIC HEALTH PRACTICE STANDARDS

Table (7) shows the result of manpower estimates for the epidemiologist position. As mentioned earlier in this discussion, there are no local epidemiologists. All of the epidemiological investigations were conducted by staff other than epidemiologists. This results in less than optimal disease surveillance and detracts from some other job function. This is the clearest example of the public health infrastructure dilemma, a true case of robbing Peter to pay Paul.

Table 7
Epidemiology Deficit for Practice Standards Compliance

Target Activity	Hours per Disease Report ¹	LHER²	Hours per Activity
Reportable Disease Investigation <i>Cases</i>	0.33	2,106	695

⁷² DiNunzio, *Estimating Registered Environmental Health Specialist Staff Needs for Local Health Departments*, 3-3.

Communicable Diseases	<i>Follow-Up</i>	2	966	1,932
	Sexually Transmitted Diseases (STD)			
	<i>Cases</i>	1	539	539
	<i>Follow-Up</i>	1	539	539
	Tuberculosis (TB)			
	<i>Cases</i>	0.33	64	21
	<i>Follow-up</i>	1	141	141
Annual Required Workload Hours		...	...	3,867
Annual Hours Available³ per Epidemiologist		...	...	1,313
Epidemiologists Required to Complete Workload Hours (N)		...	...	3
Available Epidemiologists (N)		...	...	0
Manpower Deficit Epidemiologists (N)		...	...	3

Notes:

¹ 0.33 hours (or 20 minutes) is based on local health experience

² LHER: Local Health Evaluation Report

³ Available work hours formula as explained in detail in Appendix 1

...: Indicates not applicable

Table 7. Epidemiology Deficit for Practice Standards Compliance

Table (8) shows the result of manpower estimates for the health education position. Time estimates are based on the 2004 LEHR reported activity divided by available manpower hours. Using the LEHR reported number of clients served, divided by the number of health education sessions conducted, yields a result of fifteen clients per session. The number of sessions conducted divided by the available health education man-hours yields a time frame of 6.3 hours per session. Based on experience, this is a reasonable figure to use for planning purposes when class prep time, class time, outreach,

follow-up and reporting are considered as components making up one session. Health education population targets are based on Adult Health Services Guidelines, divided by fifteen clients per session, multiplied by 6.3 hours per session. This result, divided by 1313 work hours per year, yields the estimated number of Health Educators needed to reach objectives.

Table 8
Health Education/Risk Communications (HERC) Deficit for Practice Standards Compliance

Health Education Category	Hours per Unit¹	Target Number of Sessions²	Hours per Health Education Category³
Alcohol	6.3	538	3,389
Smoking	6.3	191	1,203
Physical Fitness	6.3	210	1,323
Drug Abuse	6.3	38	239
Annual Required Workload Hours	...	...	6,155
Annual Hours Available³ per HERC	...	...	1,313
HERCs Required to Complete Workload Hours (N)	...	...	5
Available HERCs (N)	...	...	2
Manpower Deficit HERCs (N)	...	...	3

Notes:

¹ 6.3 hours per unit is based on local health agency experience with conducting programs

² Target numbers based divide hours/category by hours/unit

³ Hours calculated by multiplying hours/unit by target sessions

...: Indicates not applicable

Table 8. Health Education/Risk Communications (HERC) Deficit for Practice Standards Compliance

Table (9) shows the manpower estimates for the Public Health Nurse. Each of the required activities is assigned an hourly rate that is derived from LHA experience. These time estimates are multiplied by the target population number and then divided by 1313 hours to arrive at the full time equivalent manpower estimate.

Table 9
Public Health Nurse Deficit for Practice Standards Compliance

Activity	Hours per Unit ¹	Target Number of Clients (N)	Hours per Activity
Maternal and Child Health Clinics	0.75	2,244	1,683
Lead Screening	0.40	1,487	595
Improved Pregnancy Outcome (IPO)	2.25	482	1,085
Childhood Immunizations	0.40	2,244	898
Cervical/Breast Cancer Screening	0.45	625	281
Prostate Cancer Screening	0.54	881	476
Mammography	1.10	8,714	9,585
Diabetes Screening	0.40	2,127	851
Influenza and Pneumonia Vaccinations	0.75	16,989	12,742
Health Screenings	0.40	1,180	472
Cardiovascular Disease Screenings	0.30	2,127	638
Public School Audits	2.50	230	575
Private and Preschool	2.50	191	478

Table 9
Public Health Nurse Deficit for Practice Standards Compliance

Activity	Hours per Unit ¹	Target Number of Clients (N)	Hours per Activity
Cancer Education	0.40	10,221	4,088
Diabetes Education	0.40	2,127	851
Cardiovascular Disease Education	0.40	2,764	1,106
Annual Required Workload Hours ²	...	...	36,402
Annual Hours Available per Public Health Nurse ³	...	...	1,313
Public Health Nurses Required to Complete Workload Hours (N)	...	...	28
Available Public Health Nurses (N)	...	...	21
Manpower Deficit Public Health Nurses (N)	...	...	7

Notes:

¹ Hours per unit is based on local health agency experience with conducting programs

² As reported in Local Health Evaluation Report LHER report

³ Available work hours formula as explained in detail in Appendix 1

...: Indicates not applicable

Table 9. Public Health Nurse Deficit for Practice Standards Compliance

Table (10) shows the manpower estimates for the Registered Environmental Health Specialist (REHS) position. Manpower estimates are obtained by following the same procedure as that used in the previous table. It is critical to note that “there as been

a general rule of thumb that one Registered Environmental Health Specialist is required for a population of 15,000”⁷³ Using this ratio would result in a more serious staff deficiency.

Table 10
Registered Environmental Health Specialist (REHS) Deficit for Practice Standards Compliance

Workload	Hours per Unit ¹	Target Number of Activities	Hours per Activity
Bathing Place			
<i>Inspection</i>	2	83	166
<i>Re-inspection</i>	1	22	22
Youth Camp			
<i>Inspection</i>	2	60	120
<i>Re-inspection</i>	1	15	15
Food Establishment Surveillance			
<i>Inspection</i>	2.5	3,026	7,565
<i>Re-inspection</i>	2	696	1,392
<i>Complaint</i>	2	545	1,090
<i>Plan review</i>	1	151	151
Public Health Nuisance			
<i>Complaint</i>	1	5,566	5,566
<i>Investigation</i>	1	5,984	5,984
Childhood Lead Poisoning			
<i>Risk assessments</i>	2	466	932
<i>Residences abated</i>	8	40	320
Rabies and Zoonosis Control ²			
<i>Animal bite investigations</i>	1	1,280	1,280
<i>Pet shop inspection</i>	2	9	18
Other			
<i>Schools and Institutions</i>	2.5	230	575
<i>Court/Enforcement action</i>	3	541	1,623
Annual Required Workload Hours	...	...

⁷³ DiNunzio, *Estimating Registered Environmental Health Specialist Staff Needs for Local Health Departments*, 3-3.

Table 10
Registered Environmental Health Specialist (REHS) Deficit for Practice
Standards Compliance

Workload	Hours per Unit ¹	Target Number of Activities	Hours per Activity
			26,819
Annual Hours Available³ per REHS	1,313
REHSs Required to Complete Workload Hours (N)	27
Available REHSs (N)	17
Manpower Deficit REHSs (N)	10

Note:

¹ Hours per unit is based on local health agency experience with conducting programs

¹ Zoonosis: Diseases transmitted from animals to humans

² Available work hours formula as explained in detail in Appendix 1

...: Indicates not applicable

Table 10. Registered Environmental Health Specialist (REHS) Deficit for Practice
Standards Compliance

Table (11) provides a summary of the manpower estimates for the four core positions and reveals the need for three epidemiologists, three Health Educators, seven public health nurses and ten REHSs to comply with New Jersey Practice Standards. Review of the performance comparisons actually shows nursing performance has large gaps between targets and outcomes. The reason for this lies partially in the fact that today nurses fill health education and epidemiology roles in addition to the pure nursing duties. It is important to remember that these estimates would significantly increase the public health workforce in the county and yet they would still be well below the national average of 158 per one hundred thousand residents. The current manpower estimate is limited by restricting targeting to residents living at 200% of poverty or less. If the income restriction is removed, the manpower deficit would increase dramatically.

Table 11
Summary of Core Public Health Position Deficit for Practice Standards Compliance

Position	Workload Hours Practice Standards	Manpower Needed ¹ (N)	Current Staff (N)	Deficit (N)
Epidemiology	3,867	3	0	3
Health Education/Risk Communication	6,155	5	2	3
Public Health Nurse	36,402	28	21	7
Registered Environmental Health Specialist	26,819	27	17	10
TOTAL	73,243	63	40	23

Notes:

¹ Manpower needed is determined by Dividing Workload Hours by Available Hours. See Appendix 1.

Table 11. Summary of Core Public Health Position Deficit for Practice Standards Compliance

C. MANPOWER ESTIMATES FOR COMPLIANCE WITH BIOTERRORISM PREPAREDNESS

NJDHSS program staff in each specific program area set the standards for reporting. They are uniformly detailed in the amount of data that the grantee is required to provide on a quarterly basis. Grant requirements for each of the seven, core staff members stipulate regular monthly meetings with various local stakeholders and require submission of agendas, attendance records and minutes on a quarterly basis. The resulting reports routinely exceed thirty pages and require (at least) one week for staff to complete. This does not include the incessant follow-up telephone contacts between staff and NJDHSS seeking clarification, additional documentation or modifying the reporting system to be consistent with the guidelines of CDC preparedness goals. A conservative estimate of the “reporting-only” manpower drain is one full time equivalent. Almost

20% of the county's preparedness effort is devoted to satisfying NJDHSS oversight. This follows the findings of Elin Gursky in her study *Drafted to Fight Terror, U.S. Public Health on the Front Lines of Biological Defense* in which she concludes "many have noted that Bioterrorism planning and funding initiatives, rather than expanding resources, augmenting scalability, and amalgamating personnel had, in itself, become a unique and narrowly focused stovepipe."⁷⁴

The Local Core Capacity Infrastructure for Bioterrorism Preparedness grant was reviewed by each core position and critical task. An estimate of time to complete each function per position was determined for each task. Total hours per position were divided by available hours (1313) to determine the full time equivalent. Since most tasks require local health agency cooperation, a local time estimate was included. Table 12 represents the time estimate, evaluated by each core position, needed to complete each of Preparedness Goals and over seventy-eight required critical tasks in the Bioterrorism Preparedness Grant. When an analysis is conducted to determine manpower requirements to be in compliance with the preparedness goals, we find that the grant funded positions of Epidemiology, LINCS Coordinator and the HERC are not adequate to support the workload. Not only is there a shortfall in the funded positions but there is a significant need in the area of LHA involvement. Successful completion of each of the grant's critical tasks requires a significant local commitment and substantial cooperation that detracts from some other required activity. Compliance with the grant requirements will require an additional influx of three FTEs at the local level (LINCS or LHAs). Even this fails to take into consideration the need to bring program plans back to the municipality and coordinate them with local Emergency Operating Plans and agencies. It is unrealistic that this coordination would consume less time than the county product. Multiply that by twenty-one municipalities and a significant shortfall is revealed.

⁷⁴ Elin A. Gursky, *Drafted to Fight Terror U.S. Public Health on the Front Lines of Biological Defense* [U.S. Public Health on the front line of biological defense] (Arlington, Va.: ANSER, 2003), <http://www.homelandsecurity.org/bulletin/drafted%5Fgursky.pdf> (accessed February 4, 2006).

Table 12
Estimating Manpower Deficit for Compliance with Bioterrorism Preparedness

Preparedness Goals	Local Health Duties	Epi-Demiologist	Public Health Nurse	LINCS¹ Coordinator	HERC²	State Planner	HO³	IT⁴
1. A. All Hazards Planning	884	109	109	109	109	109	124	0
2. A. Information Collection/ Threat Recognition	40	364	7	388	364	21	21	0
2. B. Hazard Vulnerability Analysis	20	0	7	7	30	45	45	0
4. A. Health Intelligence Integration/ Analysis	385	962	234	7	982	21	104	0
5. A. Public Health Epidemiological Investigation	280	153	153	28	153	7	153	0
6.A. Emergency Response Communications	0	24	24	1,113	133	21	7	1,384
6. B. Emergency Public Information	30	64	36	47	162	12	36	0
6. C. Worker Health Safety	120	72	21	7	72	72	48	0
6. D. Isolation and Quarantine	2,120	52	52	52	60	52	88	0
6. E. Mass Prophylaxis/Vaccination	70	205	205	205	331	205	205	0
6. F. Medical & Pub Health Surge	0	46	102	18	18	36	25	0

Continued...

Table 12
Estimating Manpower Deficit for Compliance with Bioterrorism Preparedness

Preparedness Goals	Local Health Duties	Epi-Demiologist	Public Health Nurse	LINCS¹ Coordinator	HERC²	State Planner	HO³	IT⁴
Table 12 Estimating Manpower Deficit for Compliance with Bioterrorism Preparedness								
7. A. Economic & Community Recovery	0	0	0	21	84	63	84	0
8. Recover	0	32	4	14	32	14	14	0
Total Hours (Annual)	3,949	2,083	947	2,016	2,530	678	954	1,384
Manpower Needed (N)^a	3	2	1	2	2	1	1	1
Current Staff (N)	0	1	1	1	1	1	1	1
Total Deficit	3	1	0	1	1	0	0	0

Notes:

¹ Local Information Network Communication System

² Health Education/Risk Communications

³ Health Officer

⁴ Information Technology

^a Number's are rounded to nearest whole number

Table 12. Estimating Manpower Deficit for Compliance with Bioterrorism Preparedness

D. SUMMARY OF MANPOWER DEFICIT IN UNION COUNTY, NEW JERSEY

If Union County were the average United States County there would be 827 workers in the public health workforce rather than the forty-seven currently employed. According to the manpower estimates there is a manpower deficit of twenty-three positions needed to accomplish the objectives of Practice Standards. These results support the fact that public health is expected to do more with less. If you treat adverse health outcomes as public health failures review of the chronic illness morbidity and mortality in the county you can see that the public health infrastructure in Union County is insufficient to accomplish its mission.

The need to conduct this type of analysis in every county should be obvious. The workforce shortage becomes more critical when viewed from the perspective of emergency response to a biological attack or an influenza pandemic. Klitzman and Freudenberg observed that in an emergency, the public health infrastructure lacks the capacity to mount an effective response. They suggested that a standing workforce with not only the capacity to provide recognized health services but a reserve capacity was needed to effectively meet the challenges of a large scale emergency. The response to a biological attack or an influenza pandemic will entail deployment of either the Strategic National Stockpile (SNS), or a locally amassed medical stockpile. As observed in TopOff3 this will require a massive, labor intensive effort, brought together almost without warning. There are two variables and one constant in a large-scale public health response. The constant is the population base that will need medical prophylaxis. The first variable is the length of time of the disease incubation period; the longer the incubation period the more time there is to mobilize a response. The second variable is the size of the workforce available to implement the response; a large workforce can distribute prophylaxis to a given population faster than a small workforce. Using a pharmaceutical distribution-staffing model developed by the Weil/Cornell Medical

School, the Bioterrorism and Epidemic Outbreak Response Model (BERM),⁷⁵ we can predict staffing needs, based on certain conditions, for Points of Distribution (POD) to provide prophylaxis for Union County. Using a smallpox scenario with an incubation period of thirteen days, we assume that it takes three days to diagnose the primary outbreak, leaving ten days to immunize 522,541 residents to mitigate the secondary outbreak. In the NJ Health Services Grant, grantees are to strive to ensure that “smallpox vaccine can be administered to all known or suspect contact of cases within three days; and if necessary to their entire jurisdiction within ten days.”⁷⁶ Entering the Union County workforce of forty-seven people into the program we find that we will need 197 days to immunize the entire population. Giving the current workforce only 25,167 people could be immunized in the ten-day target window, leaving 497,374 people without protection. If we are to meet the ten day target we must determine how many people we will need. Based on the model and using an optimistic clinic flow rate of 120 residents per hour, BERM tells us that we need a staff 1,232 people to accomplish the task. *The Public Health Workforce Enumeration 2000* credits New Jersey with a total local public health workforce of 2,244 people. Union County would need 55% of the total local public health workforce in the state to meet the target timetable. There are twenty other counties that would be facing similar manpower shortfalls.

Table (13) is a summary of the total manpower deficit for public health professionals in Union County, NJ. To be in compliance with NJ practice standards and conform to the bioterrorism preparedness goals, twenty-nine additional staff members must be added to the public health workforce. Union County is currently staffed at 68% of the needed workforce level.

⁷⁵ Nathaniel Hupert and Jason Cuomo, "The Weill/Cornell Bioterrorism and Epidemic Outbreak Response Model (BERM)," Weill Medical College of Cornell University, http://www.aha.org/aha/key_issues/disaster_readiness/resources/vaccination.html (accessed February 6, 2006).

⁷⁶ *Local Core Capacity Infrastructure for Bioterrorism Preparedness.*

Table 13
Manpower Deficit for Compliance with Practice Standards and Bioterrorism
Preparedness
Union County, New Jersey

Position	Workload Hours Practice Standards	Workload Hours BT¹	Manpower Needed	Current Staff (2006)	Deficit
Epidemiology	3,867	2,083	5	1	4
Health Education/Risk Communication	6,155	2,530	7	3	4
Public Health Nurse	36,402	947	29	22	7
Registered Environmental Health Specialist	26,819	...	27	17	10
Deficit			68	43	25
Other Core Positions in Bioterrorism Grant					
Health Officer	...	954	1	1	0
Public Health Planner	...	678	1	1	0
LINCS Coordinator	...	2,016	2	1	1
LHA ² Support	...	3,949	3	0	3
Information Tech	...	1,384	1	1	0
Deficit			8	4	4
Total Personnel Deficit			76	47	29

Note:

¹ BT: Bioterrorism

² LHA: Local Health Agency

Table 13. Manpower Deficit for Compliance with Practice Standards and Bioterrorism Preparedness, Union County, New Jersey

VII. CONCLUSION

This research has described public health in light of new realities that include but are not limited to homeland security concerns. The purpose of this research has been to refine perceptions of public health roles and responsibilities during a response by:

- Identifying specific public health mandates at the local, state and federal level that require additional manpower investments
- Developing performance metrics that can be used to measure progress toward objectives and quantify performance deficits across the board
- Developing manpower need projections and goals
- Developing a means to forecast budget needs.

The Strategy for Homeland Security stresses the need for a robust public health component to respond to and recover from a range of emergencies from the biological dangers posed by an influenza pandemic to the use of toxic agents in a terrorist attack. This Strategy relies on the same infrastructure that has proven incapable of meeting US Department of Health and Human Services National Health objectives. The Homeland Defense strategy relies on an infrastructure that has been studied and found lacking in both workforce capacity and capability. If it is to be truly effective the national strategy must be based upon the actual, rather than the expected, capabilities of the weakest unit in the region of highest risk or vulnerability.

State and federal planners are focused on evaluating public health programs strictly from the preparedness viewpoint rather than focusing energy and funding on building up the primary function of public health. All hazards preparedness begins by strengthening the response elements that are common to a spectrum of emergency situations. Training and equipping an inadequate workforce does little to improve preparedness. The public health infrastructure is in need of massive infusions of money and manpower. The public health infrastructure is the core of Bioterrorism mitigation. In Public Health mitigation is manpower.

The Public Health infrastructure in New Jersey and nationally has been neglected for decades. Attempts were made by NJ to enhance the infrastructure by creating the

LINCS agency but sustaining these agencies will be questionable at the start of the August 2006 grant cycle. Mandates and objectives have been heaped upon this infrastructure ignoring the lack of capacity that prevents their realization. The tasks associated with traditional Public Health have a central role to play in accomplishing the Homeland Security mission. Public Health prevention concepts and personnel are essential to control infection spread, reducing vulnerabilities, minimizing damages and aiding recovery from a biological emergency. It is not enough, however, to simply assert this in Homeland Security planning documents. Logical as it may be, the public health resources need to be aligned with the new planning goals. This effort has already begun but better tools and measures are needed in order to redeploy resources, avoid duplication and generate new targeted funding.

In the 2004 edition of *America's Health: State Health Rankings; A Call to Action for People and Their Communities*, New Jersey ranked a dismal forty-first out of fifty in per capita spending on public health.⁷⁷ As if this ranking wasn't bad enough, between 2003 and 2004, New Jersey witnessed an 11% decrease in the public health budget.⁷⁸ In 2004, NJ fell to forty-eighth decreasing spending from \$32 to \$14 per person.⁷⁹ The NJDHSS accounts for less than one million dollars in public health funding to Union County while the municipalities account for more than ten million dollars in local public health budgets.⁸⁰ A total of \$758,113 for traditional public health and bioterrorism preparedness is distributed to Union County from the SDHSS. This represents approximately \$1.45 per person from the SDHSS versus approximately \$19.00 per person local contribution. One can conclude public health will have a more difficult time meeting New Jersey mandated bioterrorism efforts and traditional health services at the local level as the state 2006 budget is posted with an expected decrease of 13.2%.⁸¹ A 10% decrease in the public health workforce has already made an impact on the

⁷⁷ United Health Foundation, *America's Health: State Health Rankings - 2004 Edition*.

⁷⁸ Ibid.

⁷⁹ Ibid.

⁸⁰ *Local Health Evaluation Report (LHER)*.

⁸¹ *Health and Senior Services: Department of Health and Senior Services Overview*, D-133-D-164.

functional capacity of LHAs. As shown in Table 13, Union County needs twenty-nine people for compliance with practice standards and bioterrorism preparedness. To close the manpower gap in Union County an additional, sustained \$3 million per year needs to be added to the public health pot to fund and equip an additional twenty-nine full-time employees.

The need for reinvesting in public health is as obvious as the threat of influenza pandemic or bioterrorism is real. Victims of an influenza pandemic or bioterrorist attacks will be local, the response will be local and therefore there must be a commitment to local mitigation. It is ironic that public health is frequently referenced to in homeland security preparedness and terrorism prevention while at the same time it is being massively under funded as a Homeland Security partner. It is in the best interest of homeland security and state and local health agencies that an effective and coordinated countywide public health system be created that will utilize the valuable assets, talent and experience resident in local health departments. "The challenge is to develop interconnected and complementary systems that are reinforcing rather than duplicative and that ensure essential requirements are met."⁸² To accomplish this mission, health departments need to be given the tools and resources.

The role of public health in responding to natural and man-made disasters is an important Homeland Security issue. If public health is to become the "indispensable pillar of our national security framework"⁸³ that has been called for, then it will require not only political support but increased funding and additional manpower. If governments are serious about including public health in the homeland security mission of preventing, protecting, responding, and recovering from major events or threats, then the shortages I have identified must be rectified in every jurisdiction across the country.

This study has shown that the Union County New Jersey's Public Health infrastructure is inadequate from a manpower standpoint to either fulfill state or federal health objectives or bio preparedness functions. National studies indicate that Union

⁸² *National Strategy for Homeland Security*, 72, 4.

⁸³ Sam Nunn, "The Future of Public Health Preparedness," *Journal of Law, Medicine & Ethics* 30, no. 3 (Fall 2002): 202-210, <http://proquest.umi.com> (accessed July 17, 2005).

County is not unique in this position. As Congress scrutinizes each dollar of Homeland Security funding that is spent, the Centers for Disease Control is formulating a system of metrics to gauge public health preparedness at the local level. These metrics will be used to evaluate progress toward preparedness goals and to direct future funding toward recipients that are most likely to meet objectives. If these metrics fail to incorporate a manpower capacity element they will inadvertently favor those jurisdictions that are most capable of mounting a response and further penalize those jurisdictions that need the most support. Funding is needed to reinforce the weakest links not the strongest. This study demonstrates that better metrics can be employed to assess the infrastructure capacity and predict a baseline, staffing model that will facilitate a true “dual use,” “all hazards” public health-domestic preparedness structure.

It is imperative that the capacity of the public health infrastructure is increased as a Homeland Security priority. If infrastructure capacity is not the first step in public health preparedness, each succeeding step will be addressed as a compromise of daily priorities competing against long term goals. In the world of “just in time” supply chains, the idea of a reserve capacity has become synonymous with inefficiency, however in public health it has to be viewed as an asset, money in the bank as it were, not a liability. Investments in infrastructure capacity must be targeted according to population based health objectives if we are to maximize the dual domestic preparedness public health uses. Federal spending priorities must be re-aligned for public health to become a partner in the mission of Homeland Security. This study argues that the goal of sustainable funding for public health begins with an accurate measure of the capacities of the system in relation to demands placed upon it. Without such a measure public health will continue to fail in its primary functions and lack the capacity to meet Homeland Security goals. This study will provide the foundation for further research into the capabilities of the public health infrastructure. As quantitative workforce measures are refined, we as a public health profession will be able to plan and budget rather than fervently hope for success.

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APPENDIX

Appendix 1

Formula for Estimating Core Public Health Personnel

	Actions Taken to Estimate Personnel Need	Estimate Calculation			
Step Number					
Step 1.	Determine total Manhours per year [Multiply work week by 52]	Work Week		Total Available Annual Work Hours	
		Work Hours per Day	Weeks		
		35	52	1,820	
Step 2.	Determine total man-hours per year used to various absences	Time Off Category	Work Hours per Day	Total Days	Total Hours
		Vacation	7	12	84
		Holidays	7	13	91
		Sick	7	7	49
		Personal	7	2	14
		Training	7	7	49
		Expected time off due to absences			

Continued...

Appendix 1
Formula for Estimating Core Public Health Personnel

Appendix 1
Formula for Estimating Core Public Health Personnel

Step Number	Actions Taken to Estimate Personnel Need	Estimate Calculation			
Step 3.	Determine actual man-hours per year [Step 1 - Step 2]	Total Available Annual Work	1,820		
		Expected time off due to absences	-287		
		Remaining Available Time (Hours)	1,533		
Step 4	Determine travel and office time (hours)				
A.)	Travel time ^a (1.5)	Days (5)	Available weeks of work per year (44)	=	Travel time (Hours) 330
B.)	Office Hours ^b (1)	Days (5)	Available weeks of work per year (44)	=	Office time (Hours) +220
C.)	Travel time +	Office time		=	550
Step 5.	Determine field hours for Core Positions [Step 4C - Step 3]		Remaining Available Time	Office Time (Hours)	Available Field Hours

Appendix 1
Formula for Estimating Core Public Health Personnel
(Hours)

Epidemiology ^c	1,533	-220	= 1,313
HERC ^{1, c}	1,533	-220	= 1,313
Public Health Nurse ^c	1,533	-220	= 1,313
REHS ^{2, a}	1,533	-550	= 983

Continued...

Appendix 1
Formula for Estimating Core Public Health Personnel

Step Number	Actions Taken to Estimate Personnel Need	Estimate Calculation
Step 6.	Determine annual workload hours for each core position in Local Health Agency ^d	
	Multiply hourly average of each activity by the target number of activities per year	
Step 7.	Determine the number of core positions needed ^d	
	Divide the figure in Step 6 by the figure in Step 5	

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